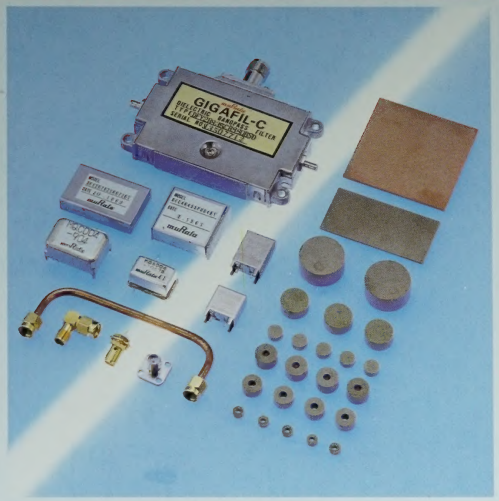
Cat. No. OG01E-5

Microwave Components



- Microwave Filter **(GIGAFIL®)-CB**
- Microwave Filter **(GIGAFIL®)-CA**
- Microwave/SHF Oscillator VCO/OSC
- Dielectric Resonator **(Resomics®) U/M/E/R** Series
- Isolator **CE060/152** Series
- HiQ Monolithic Ceramic Capacitor **GR700 Series**
- HiQ and High Power Monolithic Ceramic Capacitor **GR110** Series
- Air Trimmer Capacitor **TTA** Series

The Highest Point
APEX ASSOCIATES
21 Highland Circle
Needham, MA 02194
617-444-8070

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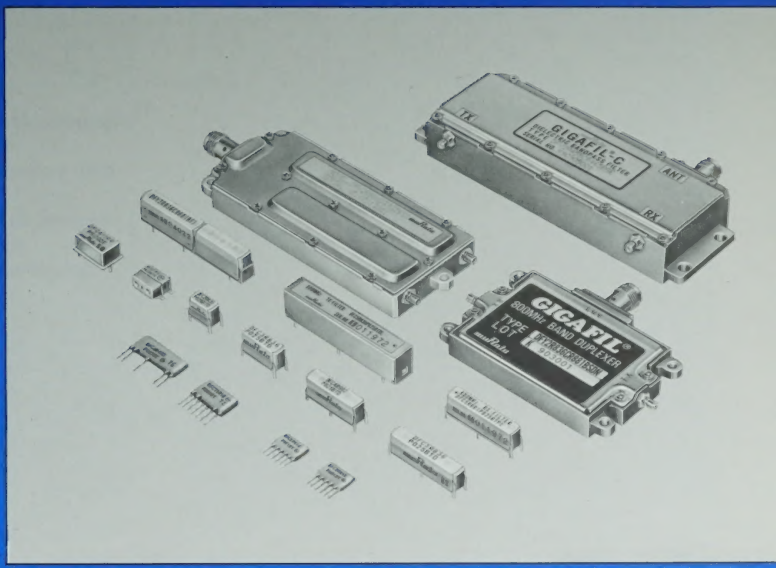
MURATA ERIE NORTH AMERICA, INC.

MICROWAVE FILTER (GIGAFIL® –CB)

MICROWAVE FILTER (GIGAFIL®)



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MURATA MFG. CO., LTD.

Cat. No. O19E-5

CONTENTS

1. 800/900MHz DUPLEXER ····· 2 ~ 6
2. 400MHz DUPLEXER ····· 7
3. PE SERIES BAND PASS FILTER ····· 8 ~10
4. PD SERIES BAND PASS FILTER ·····11
5. PE SERIES 900MHz BAND DUPLEXER ·····12
6. PC SERIES BAND PASS FILTER ·····12
NEW 7. 800/900MHz DUPLEXER ·····13~17

FEATURE

1. Low insertion for using high Q-value dielectric resonators.
2. Small and light for using high dielectric constant ceramics.
3. Excellent temperture stability for temperture compensated dielectric constant (0±5ppm/°C max).
4. Excellent mechanical stability without vibratile structure (see the table).

APPLICATIONS

- 400/800MHz Band automobile phone system
- MCA・LMR・GPS
- Cordless telephone system
- BS/CS
- Other land mobile radio

RATING

Characteristic Impedance	50Ω
Operation Temperature (Nominal)	−30℃~+85℃
Storage Temperature (Nominal)	−40℃~+90℃

PERFORMANCE

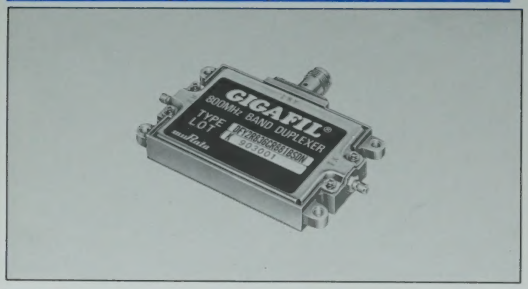
Vibration	MIL-STD-202, 204, A
Shock	MIL-STD-202, 213, A
Humidity	MIL-STD-202, 103, B
Heat Shock	MIL-STD-202, 107, A

MICROWAVE FILTER

muRata

Dielectric Microwave Filter (GIGAFIL®-CB) 800/900MHz Duplexer

Standard type Duplexer (E-AMPS)



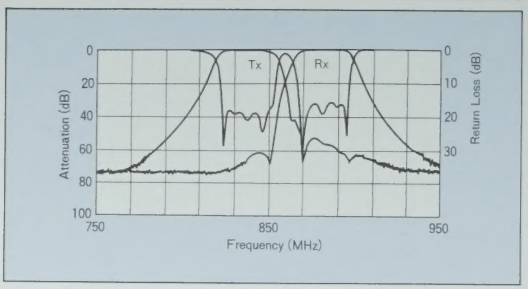
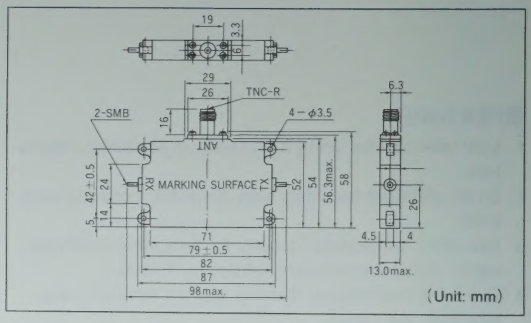
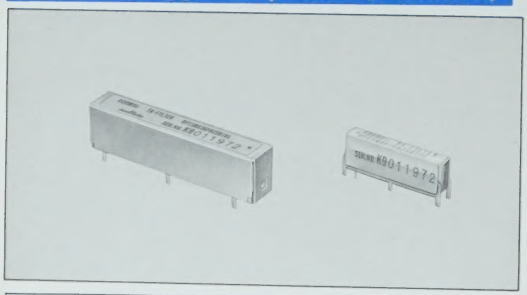


Fig.1 DFY2R836CR881BSDN Transmisson and Reflection Characteristics



Part Number	DFY2R836CR881BSDN	
Center Frequency	Tx 836.5MHz	Rx 881.5MHz
Bandwidth (BW)	25MHz	25MHz
Insertion Loss in BW	2.0dB max.	2.7dB max.
Ripple in BW	0.7dB max.	1.1dB max.
V.S.W.R. in BW	1.6 max.	1.6 max.
Attenuation	75dB min. at 754MHz	90dB min. at 800MHz
	35dB min. at 800MHz	60dB min. at 824~849MHz
	50dB min. at 869~894MHz	35dB min. at 915MHz
	60dB min. at 915MHz	60dB min. at 1648MHz
	60dB min. at 1648MHz	——
Maximum Rated Power	20W	——

Sparated type Duplexer (E-AMPS)



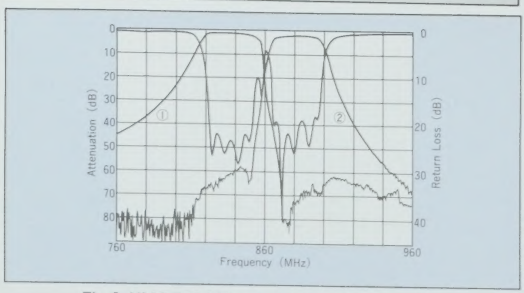
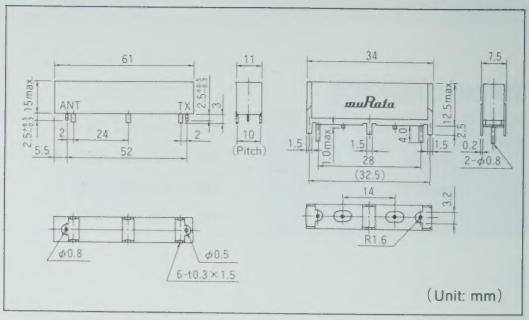


Fig.2 KMGC104 Transmisson and Reflection Characteristics

DIMENSIONS



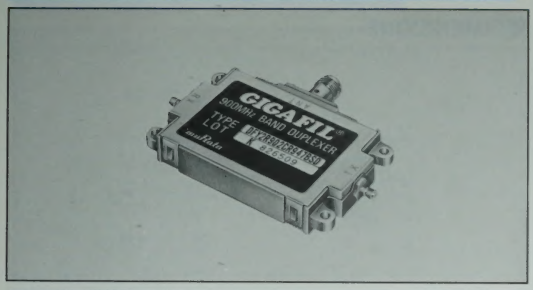
Kit Part Number	KMGC104A	
Part Number	DFC5R836P025ETRL	DFC5R881P025ETPL
Center Frequency	Tx 836.5MHz	Rx 881.5MHz
Bandwidth (BW)	25MHz	25MHz
Insertion Loss in BW	2.3dB max.	3.5dB max.
Ripple in BW	1.0dB max.	1.1dB max.
V.S.W.R. in BW	1.7 max.	1.6 max.
Attenuation	50dB min. at 869~894MHz	55dB min. at 824~849MHz
	40dB min. at 1648~1698MHz	——
	20dB min. at 2472~2547MHz	——
Maximum Rated Power	10W	——
Number of Char. Graph.	①	②

MICROWAVE FILTER

muRata

Dielectric Microwave Filter (GIGAFIL®-CB) 800/900MHz Duplexer

Standard type Duplexer (NMT900)



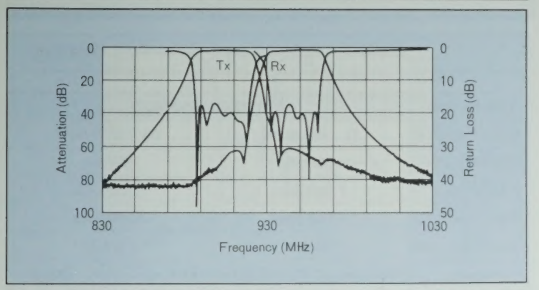
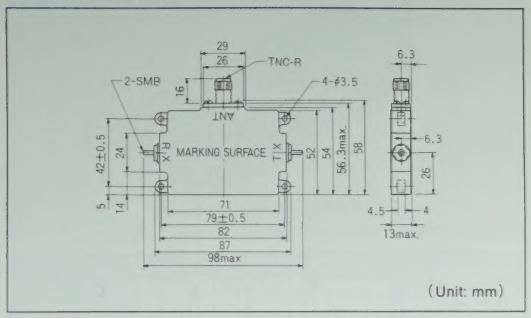


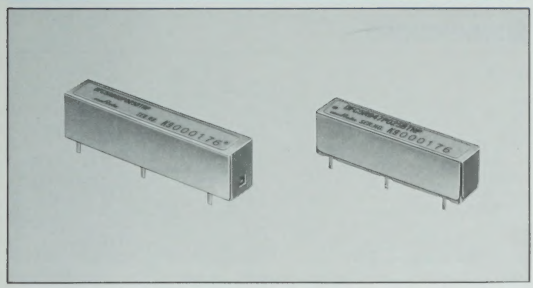
Fig.3 DFY2R902CR947BSD Transmisson and Reflection Characteristics

DIMENSIONS



Part Number	DFY2R902CR947BSD	
Center Frequency	Tx 902.5MHz	Rx 947.5MHz
Bandwidth (BW)	25MHz	25MHz
Insertion Loss in BW	2.0dB max.	2.7dB max.
Ripple in BW	0.7dB max.	1.1dB max.
V.S.W.R. in BW	1.6 max.	1.6 max.
Attenuation	50dB min. at 935~960MHz	60dB min. at 890~915MHz
	60dB min. at 980MHz	35dB min. at 980MHz
	65dB min. at 1025MHz	65dB min. at 1025MHz
	65dB min. at 1780~1830MHz	——
Maximum Rated Power	20W	——

Sparated type Duplexer (NMT900)



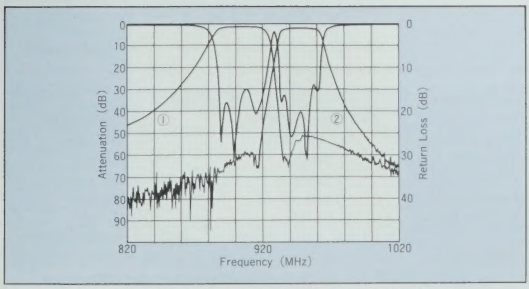
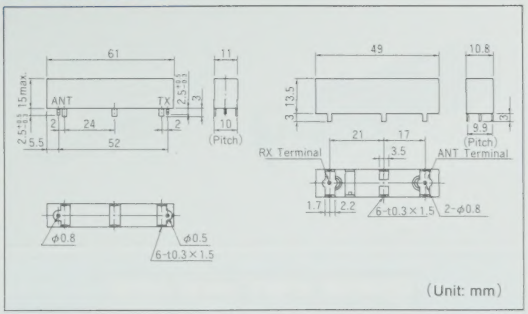


Fig.4 KMGC105 Transmisson and Reflection Characteristics

DIMENSIONS



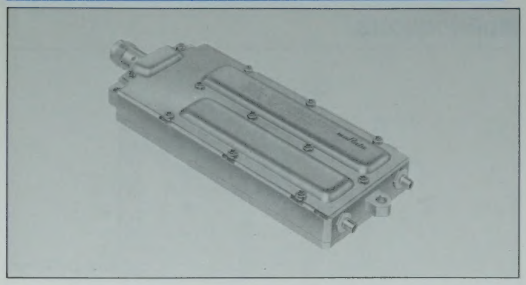
Kit Part Number	KMGC105	
Part Number	DFC5R902P025BTRP	DFC5R947P025BTRP
Center Frequency	Tx 902.5MHz	Rx 947.5MHz
Bandwidth (BW)	25MHz	25MHz
Insertion Loss in BW	2.2dB max.	2.7dB max.
Ripple in BW	1.0dB max.	1.1dB max.
V.S.W.R. in BW	1.7 max.	1.6 max.
Attenuation	50dB min. at 935~960MHz	55dB min. at 890~915MHz
	50dB min. at 1780~1830MHz	——
	25dB min. at 2670~2745MHz	——
Maximum Rated Power	10W	——
Number of Char. Graph.	①	②

MICROWAVE FILTER

muRata

Dielectric Microwave Filter (GIGAFIL® -CB) 800/900MHz Duplexer

Standard type Duplexer (E-TACS)



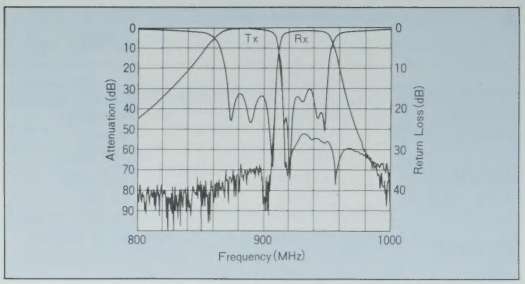
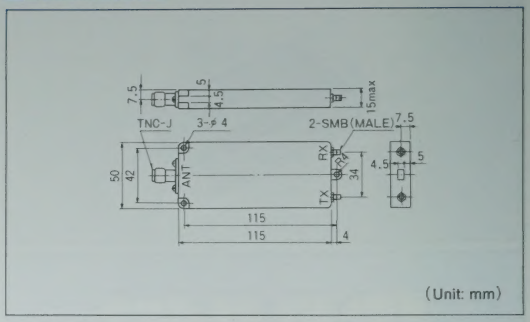


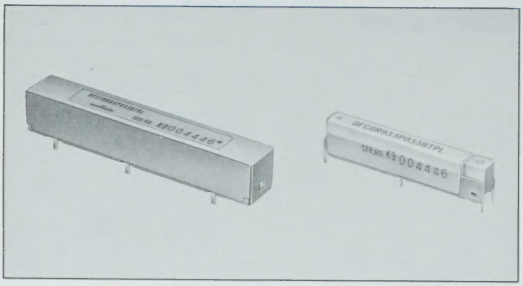
Fig.5 DFY2R888CR933BSD Transmisson and Reflection Characteristics

DIMENSIONS



Part Number	DFY2R888CR933BSD	
Center Frequency	Tx 888.5MHz	Rx 933.5MHz
Bandwidth (BW)	33MHz	33MHz
Insertion Loss in BW	2.5dB max.	3.5dB max.
Ripple in BW	1.2dB max.	2.0dB max.
V.S.W.R. in BW	1.6 max.	1.6 max.
Attenuation	47dB min. at 917~950MHz	60dB min. at 872~905MHz
Maximum Rated Power	10W	—

Sparated type Duplexer (E-TACS)



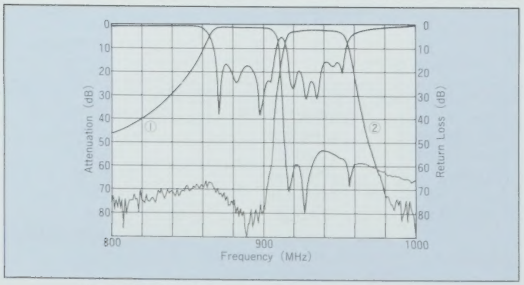
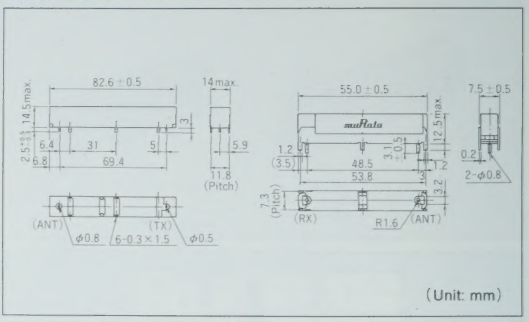


Fig.6 KMGC108 Transmisson and Reflection Characteristics

DIMENSIONS



Kit Part Number	KMGC108A	
Part Number	DFC7R888P033ETRL	DFC8R933P033ETPL
Center Frequency	Tx 888.5MHz	Rx 933.5MHz
Bandwidth (BW)	33MHz	33MHz
Insertion Loss in BW	2.7dB min.	4.5dB max.
Ripple in BW	1.6dB min.	1.8dB max.
V.S.W.R. in BW	1.8 max.	1.8 max.
Attenuation	50dB min. at 917~950MHz	58dB min. at 872~905MHz
	50dB min. at 1744~1810MHz	60dB min. at 1009~1042MHz
	25dB min. at 2616~2715MHz	—
Maximum Rated Power	10W	—
Number of Char. Graph.	①	②

MICROWAVE FILTER

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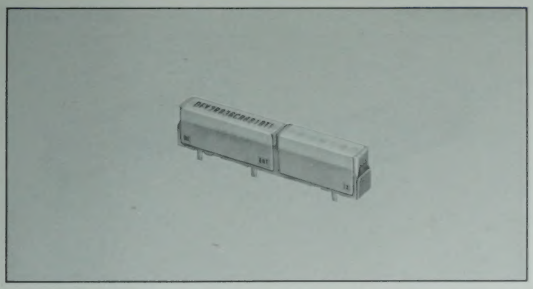
Dielectric Microwave Filter (GIGAFIL®-CB) 800/900MHz Duplexer

Small Duplexer (E-AMPS)



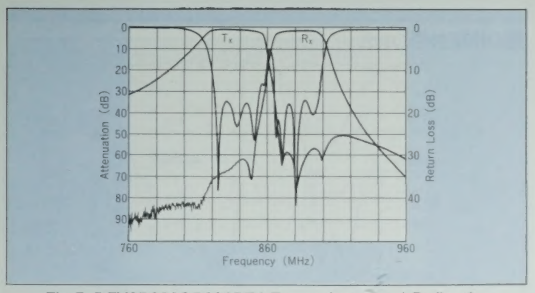


Fig.7 DFY2R836CR881BTJ Transmisson and Reflection Characteristics

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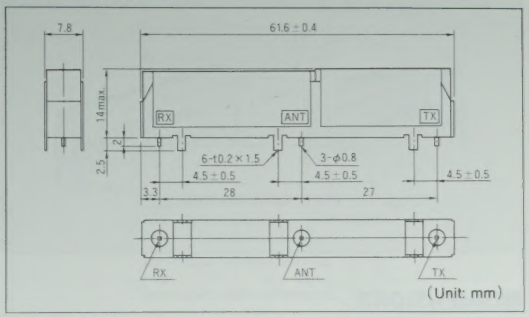
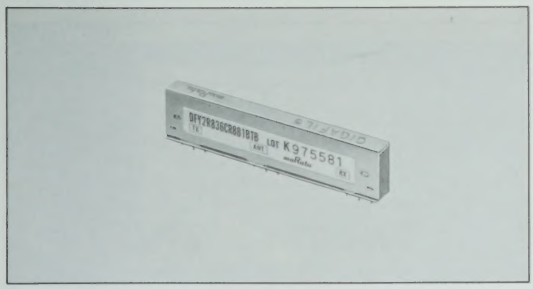


Part Number	DFY2R836CR881ETJ	
Center Frequency	Tx 836.5MHz	Rx 881.5MHz
Bandwidth (BW)	25MHz	25MHz
Insertion Loss in BW	2.2dB max.	3.0dB max.
Ripple in BW	0.9dB max.	1.4dB max.
V.S.W.R. in BW	1.7 max.	1.7 max.
Attenuation	30dB min. at 754MHz	80dB min. at 800MHz
	45dB min. at 869~894MHz	54dB min. at 824~849MHz
	40dB min. at 915MHz	30dB min. at 915MHz
Maximum Rated Power	6W	—



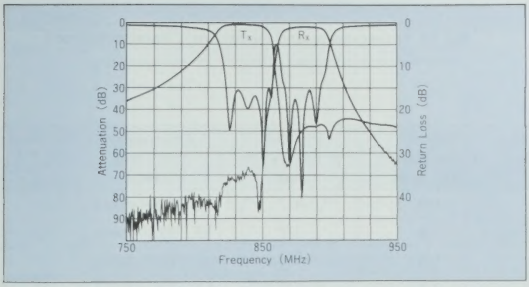


Fig.8 DFY2R836CR881BTB Transmisson and Reflection Characteristics

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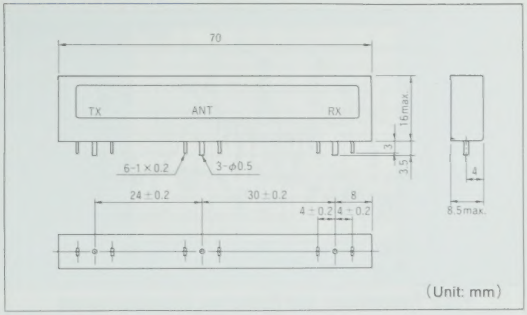


Part Number	DFY2R836CR881BTB	
Center Frequency	Tx 836.5MHz	Rx 881.5MHz
Bandwidth (BW)	25MHz	25MHz
Insertion Loss in BW	2.3dB max.	3.6dB max.
Ripple in BW	0.7dB max.	1.4dB max.
V.S.W.R. in BW	1.7 max.	1.7 max.
Attenuation	13dB min. at 870MHz	60dB min. at 824~849MHz
	40dB min. at 869~894MHz	30dB min. at 980MHz
	40dB min. at 980~1830MHz	50dB min. at 1025~1050MHz
	—	20dB min. at 1870~2500MHz
Maximum Rated Power	3W	—

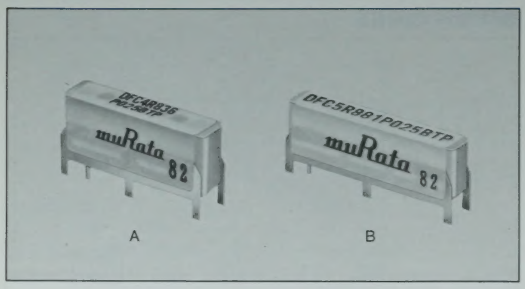
• NMT900 series is also available.

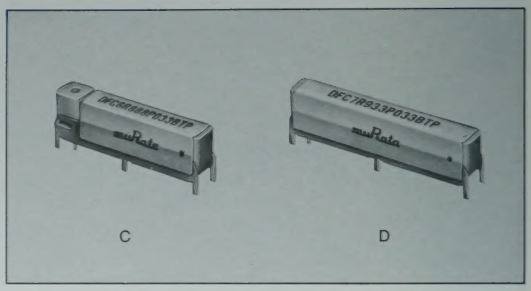
MICROWAVE FILTER

muRata

Dielectric Microwave Filter (GIGAFIL® -CB) 800/900MHz Duplexer

Separated small Duplexer (E-AMPS)





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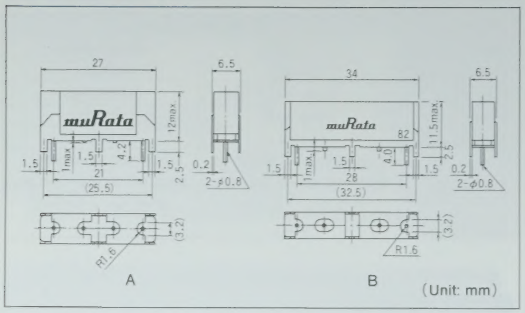

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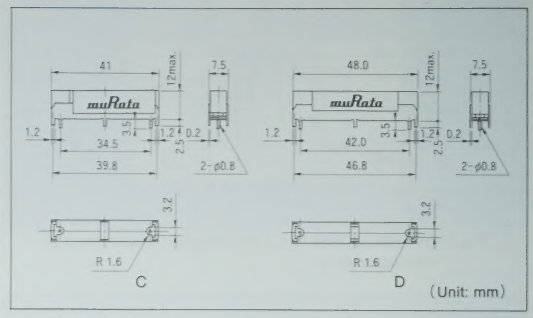


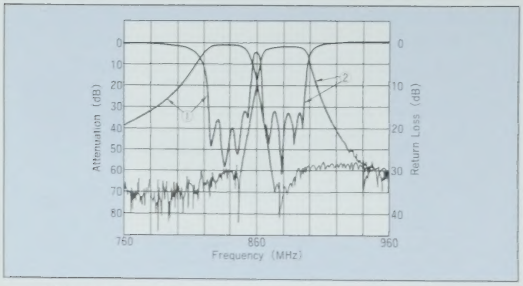


Fig.9 Transmisson and Reflection Characteristicscs

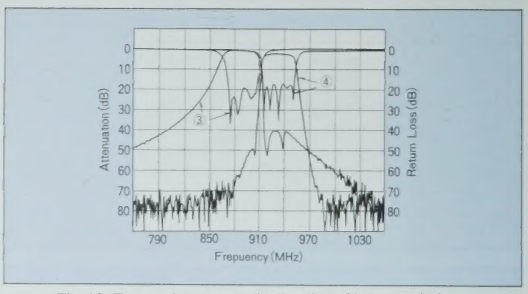


Fig.10 Transmisson and Reflection Characteristicscs

E-AMPS/NMT900/E-TACS

Part Number	Center Freq. Fo (MHz)	Bandwidth (MHz)	Insertion Loss in Bandwidth (dB) max.	Ripple in Bandwidth (dB) max.	V.S.W.R. in Bandwidth max.	Attenuation (dB) min. (MHz)	Number of the Char. Graph.
DFC4R836P025BTP	836.5	Fo±12.5	2.5	1.0	1.7	40 [869~894]	①
DFC5R881P025BTP	881.5		3.5	1.5	1.7	53 [824~849]	②
DFC4R902P025BTP	902.5		2.5	1.0	1.8	40 [935~960]	①
DFC5R947P025BTP	947.5		3.5	1.5	1.7	53 [890~915]	②
DFC6R888P033BTP	888.5	Fo±16.5	2.6	1.4	1.8	37 [917~950]	③
DFC7R933P033BTP	933.5		3.8	1.6	2.0	45 [872~905]	④

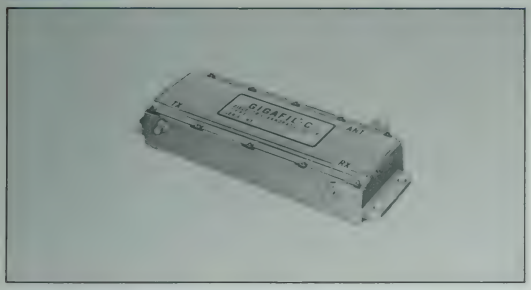
MICROWAVE FILTER

muRata

Dielectric Microwave Filter (GIGAFIL® -CB)

400MHz Band Duplexer

NMT450



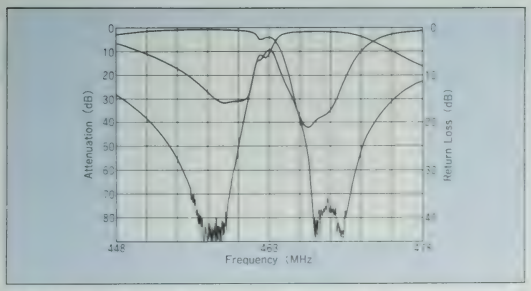
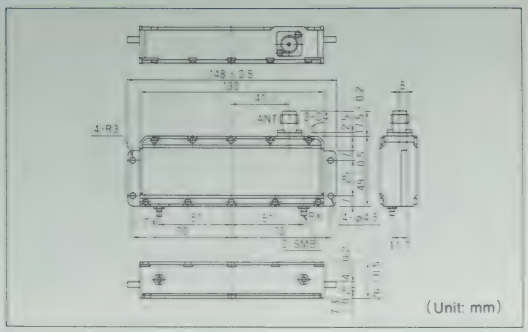


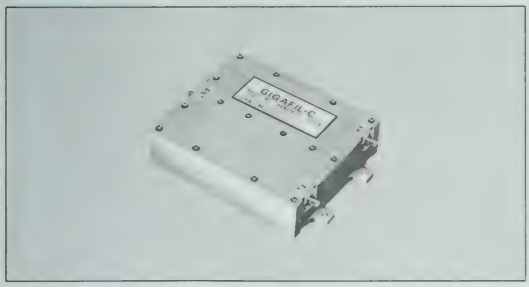
Fig.11 DFY2R455CR465BSE Transmission Characteristicscs

DIMENSIONS



Part Number	DFY2R455CR465BSE	
Center Frequency	Tx 455.25MHz	Rx 465.25MHz
Bandwidth (BW)	4.5MHz	4.5MHz
Insertion Loss in BW	1.9dB max.	3.0dB max.
Ripple in BW	1.0dB max.	1.0dB max.
V.S.W.R. in BW	1.6 max.	1.6 max.
Attenuation	65dB min. at 463~467.5MHz	72dB min. at 453~457.5MHz
Maximum Rated Power	20W	——

NMT450



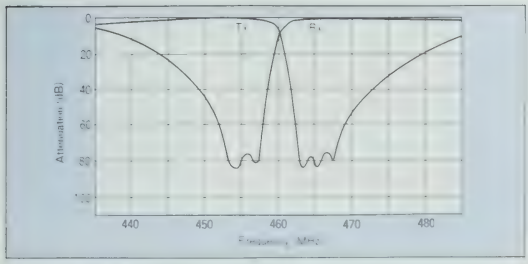
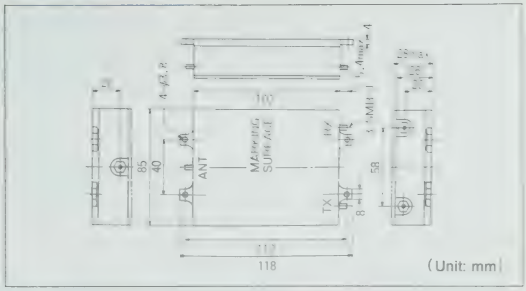


Fig.12 DFY2R455CR465BSD Transmission Characteristicscs

Note: 400/500MHz Duplexer consists of two band ellimination filters (B.E.F.)

DIMENSIONS



Part Number	DFY2R455CR465BSD	
Center Frequency	Tx 455.25MHz	Rx 465.25MHz
Bandwidth (BW)	4.5MHz	4.5MHz
Insertion Loss in BW	2.1dB max.	2.1dB max.
Ripple in BW	0.9dB max.	1.1dB max.
V.S.W.R. in BW	1.5 max.	1.5 max.
Isolation	72dB min. at 453 to 457.5MHz	
	72dB min. at 463 to 467.5MHz	
	35dB min. at 467.5 to 470MHz	
Maximum Rated Power	30W	——

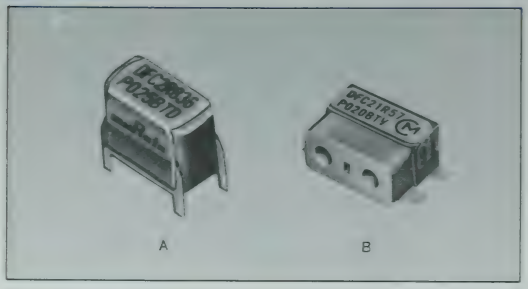
MICROWAVE FILTER

muRata

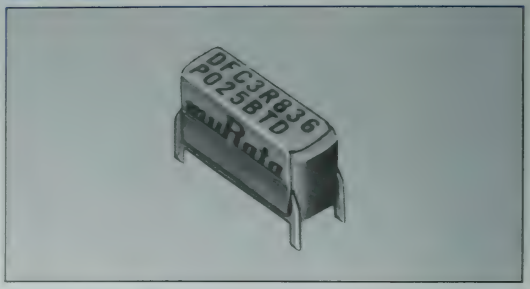
Dielectric Microwave Filter (GIGAFIL[R] -CB)

PE Series Bandpass Filter (2・3 Poles)

2 Poles



3 Poles



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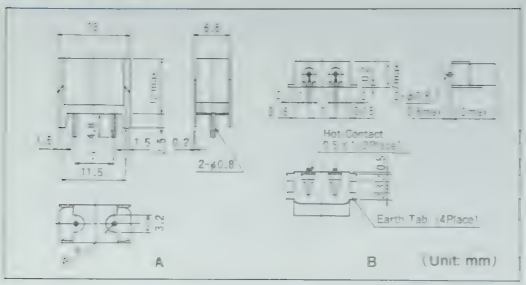

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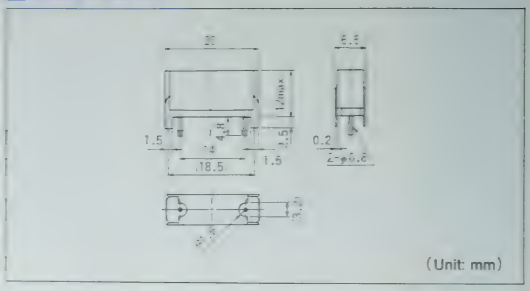


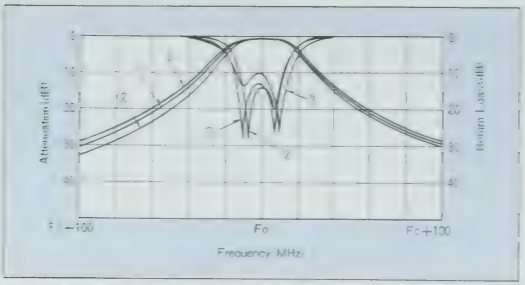


Fig.13 Transmisson and Reflection Characteristics

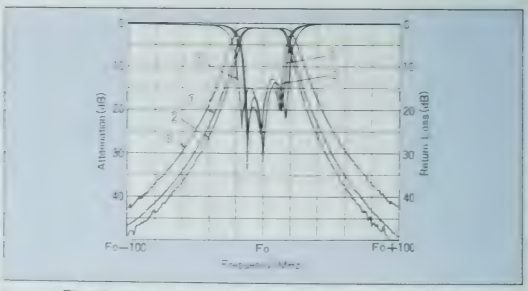


Fig.15 Transmisson and Reflection Characteristics

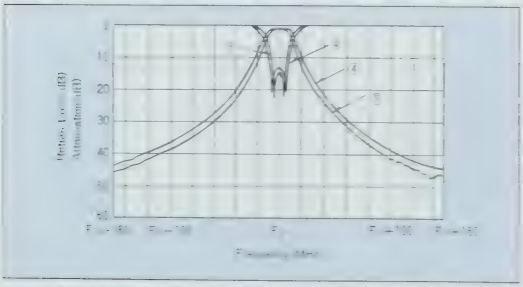


Fig.14 Transmisson and Reflection Characteristics

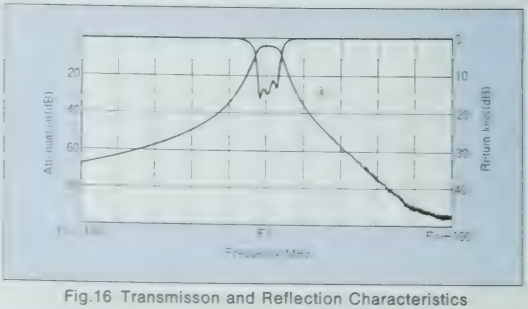


Fig.16 Transmisson and Reflection Characteristics

MICROWAVE FILTER

muRata

Dielectric Microwave Filter (GIGAFIL® -CB)

2 Poles

■E-AMPS/NMT900/E-TACS/Cordless Telephone/MCA/LMR/GPS

Part Number	Type	Center Freq. Fo (MHz)	Bandwidth (MHz)	Insertion Loss in Bandwidth (dB) max.	Ripple in Bandwidth (dB) max.	V.S.W.R. in Bandwidth max.	Attenuation (dB) min. (MHz)	Number of the Char. Graph
DFC2R836P025BTD	A	836.5	Fo±12.5	1.8	0.8	2.2	20 〔Fo±77.5〕	①
DFC2R881P025BTD		881.5						
DFC2R902P025BTD		902.5				2.0		
DFC2R947P025BTD		947.5						
DFC2R933P033BTD		933.5	Fo±16.5	2.5	1.2	2.2	20 〔Fo±77.5〕	③
DFC2R914P001BTA		914.5	Fo±0.5	2.2	0.5	2.0	24 〔Fo±45〕	⑤
DFC2R959P001BTA		959.5						
DFC2R886P002BTA		886	Fo±1					
DFC2R931P002BTA		931						
DFC2R855P010BTD		855	Fo±5	2.2	1.0	2.0	37 〔960〕	④
DFC2R910P010BTD		910					20 〔860〕	
DFC2R847P026BTD		847	Fo±13	2.2	1.0	2.2	26 〔944〕	①
DFC2R902P026BTD		902					13 〔Fo±42〕	
DFC2R835P006BTD		835	Fo±3	3.5		2.0	12 〔Fo±24.5〕	④
DFC2R890P006BTD		890						
DFC2R815P020BTD		815	Fo±10	1.8	0.8	2.0	10 〔Fo±35〕	②
DFC2R860P020BTD		860						
DFC21R22P020BT		1227	Fo±10	2.0	1.0	2.0	7 〔Fo±30〕	
DFC21R57P020BTA		1575		1.2			25 〔Fo±50〕	
DFC21R57P020BTV	B	1575		2.0	1.0		30 〔Fo±140〕	

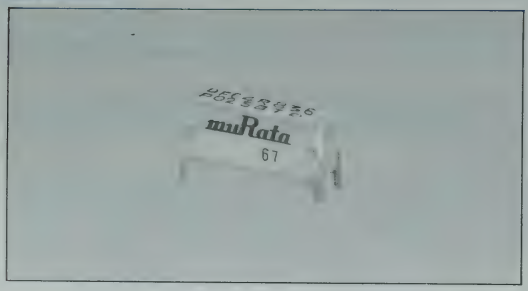
3 Poles

■E-AMPS/NMT900/E-TACS/Cordless Telephone/LMR

Part Number	Center Freq. Fo (MHz)	Bandwidth (MHz)	Insertion Loss in Bandwidth (dB) max.	Ripple in Bandwidth (dB) max.	V.S.W.R. in Bandwidth max.	Attenuation (dB) min. (MHz)	Number of the Char. Graph
DCF3R836P025BTD	836.5	Fo±12.5	2.0	0.8	2.0	12 〔Fo±32.5〕	①
DFC3R881P025BTD	881.5						
DFC3R902P025BTD	902.5						
DFC3R947P025BTD	947.5						
DFC3R888P033BTD	888.5	Fo±16.5	2.5	0.8	2.0	6 〔Fo±28.5〕	③
DFC3R933P033BTD	933.5						
DFC3R914P001BTD	914.5	Fo±0.5	4.0	0.5	2.0	45 〔Fo-45〕	④
DFC3R959P001BTD	959.5						
DFC3R886P002BTD	886	Fo±1.0				55 〔Fo+45〕	
DFC3R931P002BTD	931						
DFC3R815P020BTD	815	Fo±10	2.0	1.0	2.0	18 〔Fo±35〕	②
DFC3R860P020BTD	860						

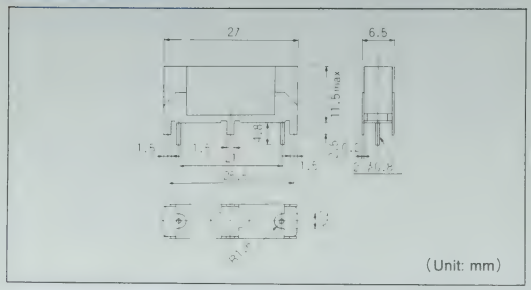
PE Series Bandpass Filter (4, 5 Poles)

4 Poles



5 Poles

DIMENSIONS



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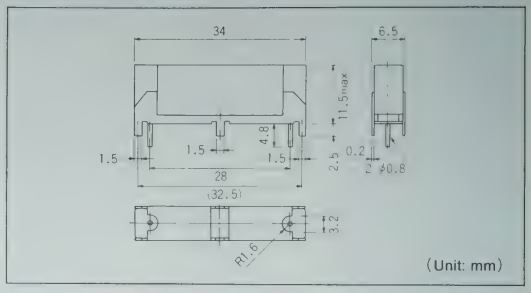


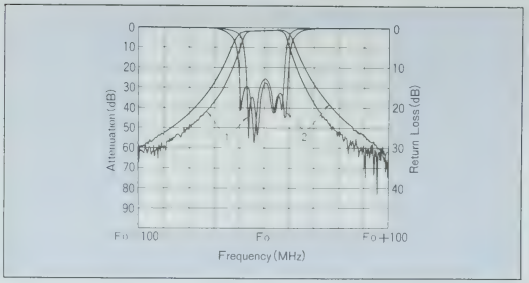


Fig.17 Transmisson and Reflection Characteristics

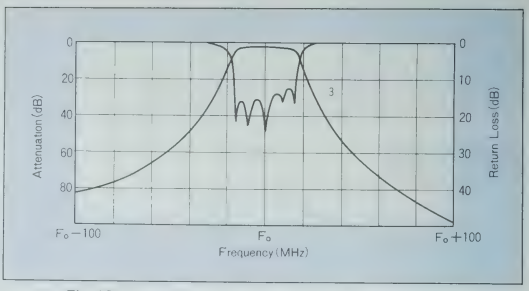


Fig.18 Transmisson and Reflection Characteristics

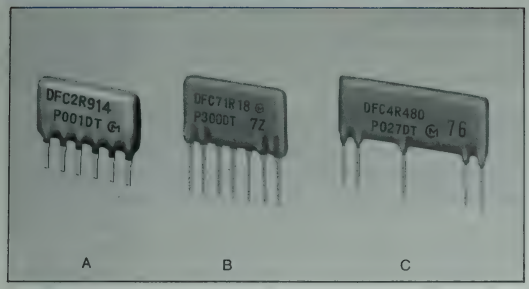
4 Poles E-AMPS/UK-TACS/NMT900/E-TACS

Part Number	Center Freq. Fo (MHz)	Bandwidth (MHz)	Insertion Loss in Bandwidth (dB) max.	Ripple in Bandwidth (dB) max.	V.S.W.R. in Bandwidth max.	Attenuation (dB) min. (MHz)	Number of the Char. Graph
DFC4R836P025BTD	836.5	Fo±12.5	2.7	1.0	2.0	23 〔Fo±32.5〕	①
DFC4R881P025BTD	881.5						
DFC4R902P025BTD	902.5						
DFC4R947P025BTD	947.5						
DFC4R888P033BTD	888.5	Fo±16.5	2.5			10 〔Fo±28.5〕	②
DFC4R933P033BTD	933.5						

5 Poles E-AMPS/UK-TACS/NMT900

Part Number	Center Freq. Fo (MHz)	Bandwidth (MHz)	Insertion Loss in Bandwidth (dB) max.	Ripple in Bandwidth (dB) max.	V.S.W.R. in Bandwidth max.	Attenuation (dB) min. (MHz)	Number of the Char. Graph
DFC5R836P025BTD	836.5	Fo±12.5	3.0	1.0	2.0	32 〔Fo±32.5〕	③
DFC5R881P025BTD	881.5						
DFC5R902P025BTD	902.5						
DFC5R947P025BTD	947.5						

PD Series Bandpass Filter



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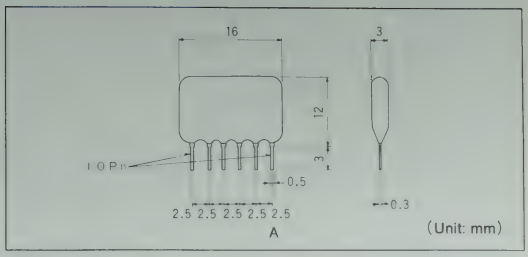


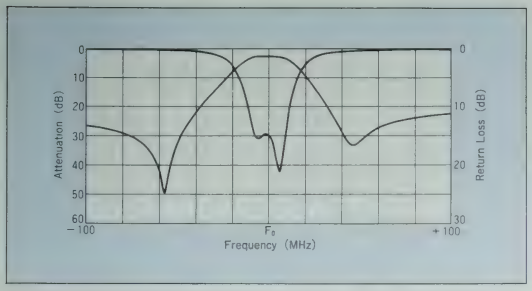
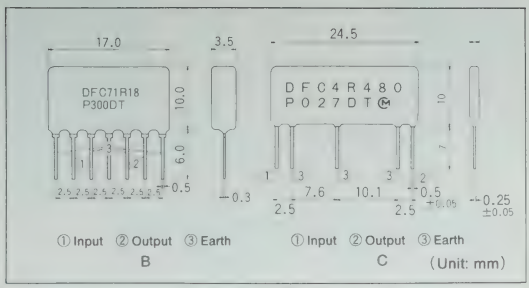


Fig.19 DFC2R914P001DTN Transmisson and Reflection Characteristics



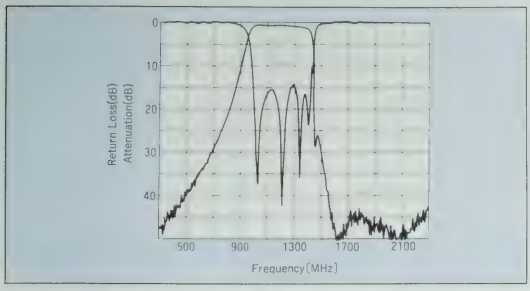


Fig.20 DFC71R18P300DT Transmisson and Reflection Characteristics

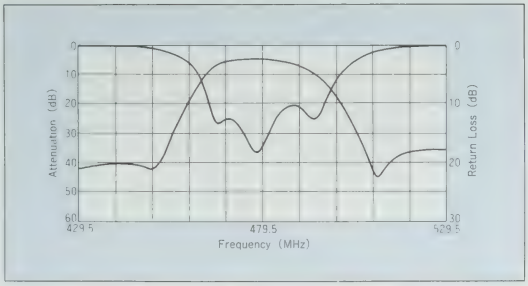


Fig.21 DFC4R480P027DT Transmisson and Reflection Characteristics

Part Number	Type	Center Freq. (MHz)	Bandwidth (MHz)	Insertion Loss in Bandwidth (dB) max.	Ripple in Bandwidth (dB) max.	V.S.W.R. in Bandwidth max.	Attenuation (dB) min. (MHz)	Max. Rated Power (W)
DFC2R914P001DTN	A	914.5	Fo±0.5	2.5	0.3	2.0	15 〔Fo±45〕	0.5
DFC2R959P001DTN		959.5						

Part Number	Type	Center Freq. Fo (MHz)	Bandwidth (MHz)	Insertion Loss in Bandwidth (dB) max.	Ripple in Bandwidth (dB) max.	V.S.W.R. in Bandwidth max.	Attenuation (dB) min. (MHz)	Max. Rated Power (W)
DFC71R18P300DT	B	1183	Fo±150	2.5	1.3	2.0	10 〔1452〕	0.1
							35 〔1750〕	
DFC71R35P800DT		1350	Fo±400	2.0	1.5		25 〔Fo−800〕	
							30 〔Fo+800〕	
DFC5R402P027DTA	C	402.78	※1 Fo±13.5	※2 7.5	—	※3 2.2	23 〔Fo±25〕	0.1
DFC4R480P027DT		479.50		※2 5.5			18 〔Fo±27〕	

※1：3dB band width
※2：insertion loss at Fo
※3：VSWR at Fo

PE series 900MHz band Duplexer

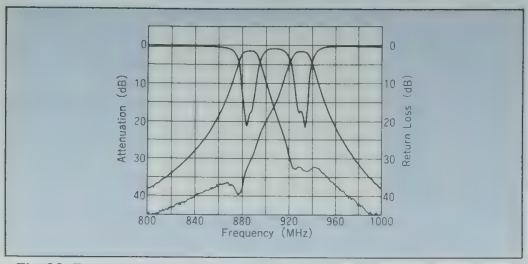
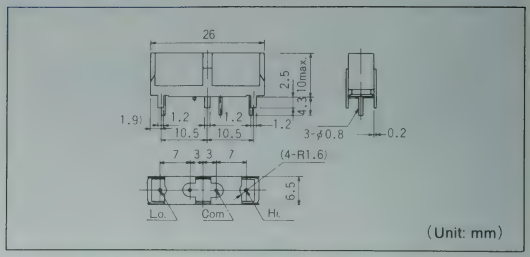


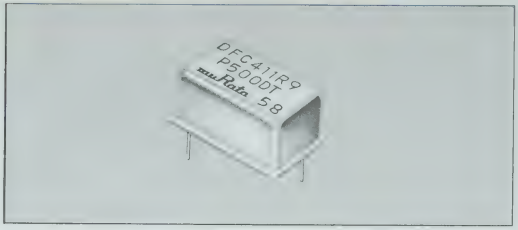
Fig.22 Transmisson Characteristicscs of DFY2R886CR931BTD

DIMENSIONS



Part Number	DFY2R886CR931BTD	
Center Frequency	Lo 886.0MHz	Hi 931.0MHz
Passband Width (BW)	2.0MHz	2.0MHz
Insertion Loss in BW	2.2dB max.	2.2dB max.
Ripple in BW	0.5dB max.	0.5dB max.
V.S.W.R.	2.0 max.	2.0 max.
Attenuation	25dB min. (Fo±45MHz)	25dB min. (Fo±45MHz)
Maximum Rated Power	1W	1W

PC Series Bandpass Filter



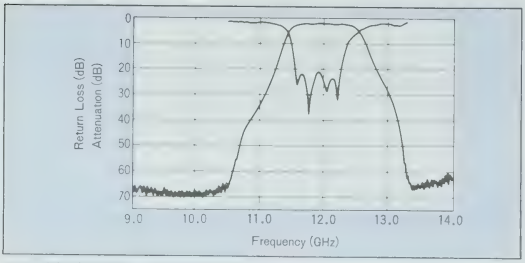
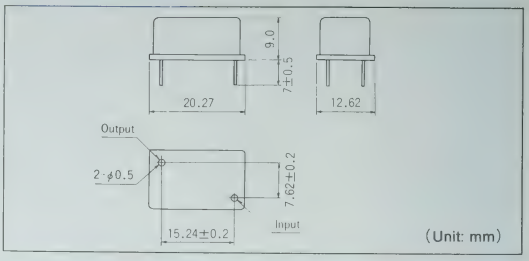


Fig.23 DFC411R9P500DT Transmisson and Reflection Characteristics

DIMENSIONS



Part Number	DFC411R9P500DT	DFC412R4P500DT
Center Frequency	11950MHz	12450MHz
Passband Width (BW)	Fo±250MHz	Fo±250MHz
Insertion Loss in BW	3.0dB max.	3.0dB max.
Ripple in BW	1.0dB max.	1.0dB max.
V.S.W.R.	1.7 max.	1.7 max.
Attenuation	20dB min. (10700MHz)	20dB min. (11200MHz)
Maximum Rated Power	0.1W	0.1W

MICROWAVE FILTER

muRata

GIGAFIL® 800/900MHz BAND PORTABLE PHONE

.Suitable for Miniature Equipment !!

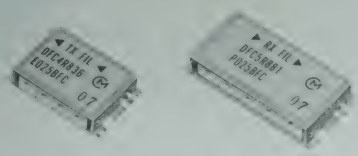
Ultra Small Surface Mounting Duplexer.

FEATURES

1. Small and light for high dielectric constant ceramics.
2. Excellent temperature stability for the temperature compensated dielectric constant.
3. Tx and Rx are separated, surface mounting device.
4. Low insertion loss for using BEF constraction at Tx Filter.

APPEARANCE

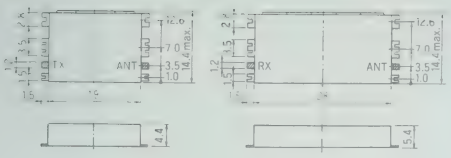
EAMPS/NMT900



ETACS

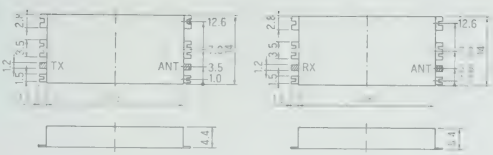
DIMENSION

EAMPS/NMT900



(Unit : mm)

ETACS



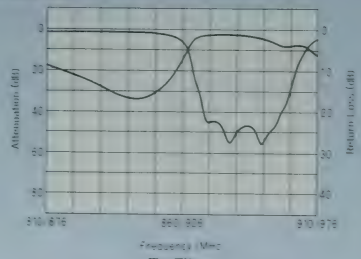
(Unit : mm)

RATING

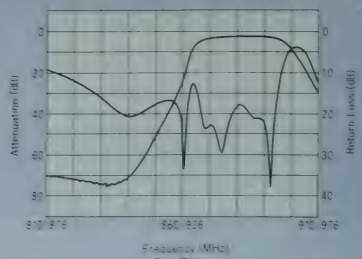
MARKET	PART NUMBER	CENTER FREQUENCY (MHz)	BAND WIDTH (MHz)	INSERTION LOSS IN BW (dB)MAX.	RIPPLE IN BW (dB)MAX.	VSWR IN BW MAX.	ATTENUATION (dB)MIN.
EAMPS	DFC4R836E025BFC	836.5(F_T)	25	2.5	1.5	2.0	40(F_R±12.5)
	DFC5R881P025BFC	881.5(F_R)	25	4.0	1.8	2.0	54(F_T±12.5)
NMT900	DFC4R902E025BFD	902.5(F_T)	25	2.5	1.5	2.0	40(F_R±12.5)
	DFC5R947P025BFD	947.5(F_R)	25	3.8	1.8	2.0	50(F_T±12.5)
ETACS	DFC5R888E033BFD	888.5(F_T)	33	3.5	2.5	2.0	40(F_R±12.5)
	DFC5R933P033BFD	933.5(F_R)	33	4.2	3.0	2.0	49(F_T±12.5)

TYPICAL CHARACTERISTICS

EAMPS/NMT900

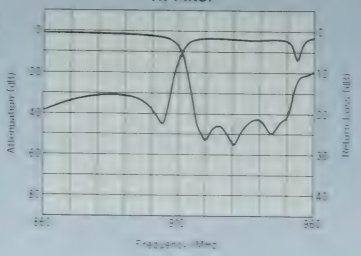


Tx Filter

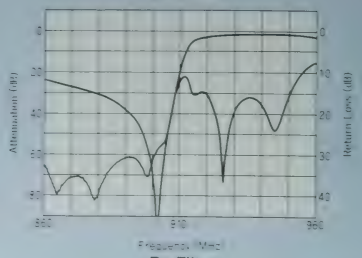


Rx Filter

ETACS



Tx Filter



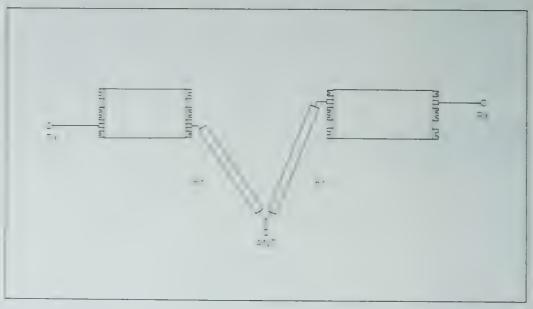
Rx Filter

CONDITION FOR USE

(1) Condition of Tx/Rx Filter connection

Tx/Rx Filter should be connected with the described electrical length of transmission line (Zo=50Ω).

MARKET	θ t	θ r
EAMPS	133°at 881.5MHz	0°at 836.5MHz
NMT900	123°at 947.5MHz	225°at 902.5MHz
ETACS	170°at 933.5MHz	186°at 888.5MHz



MICROWAVE FILTER

muRata

GIGAFIL® 800/900MHz BAND PORTABLE PHONE

Low Insertion Loss · High Selectivity

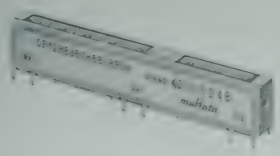
High Performance Duplexer.

■FEATURES

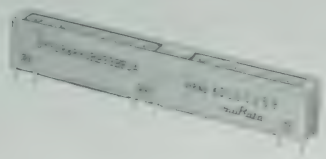
- Low insertion loss and high selectivity for using high Q-value dielectric resonators.
- Excellent temperture stability for temperture compensated dielectric constant (0±5ppm/℃max).

■APPEARANCE

E-AMPS

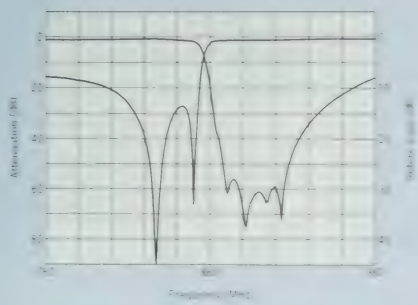


E-TACS

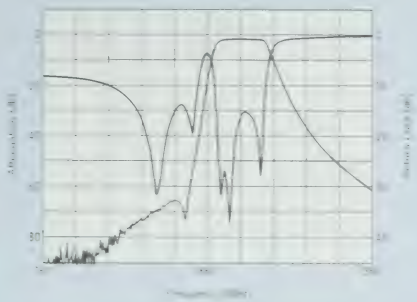


■TYPICAL CHARACTERISTICS

E-AMPS



Tx-SIDE

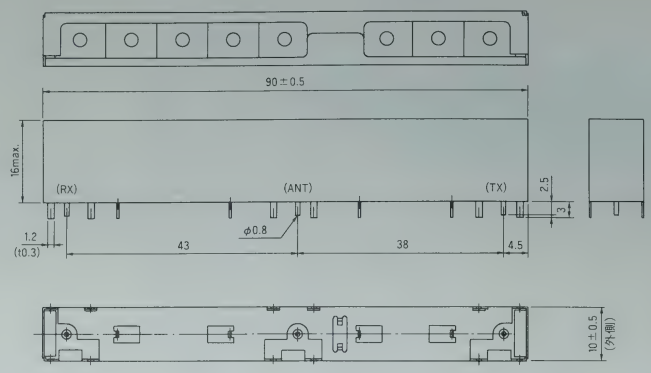


Rx-SIDE

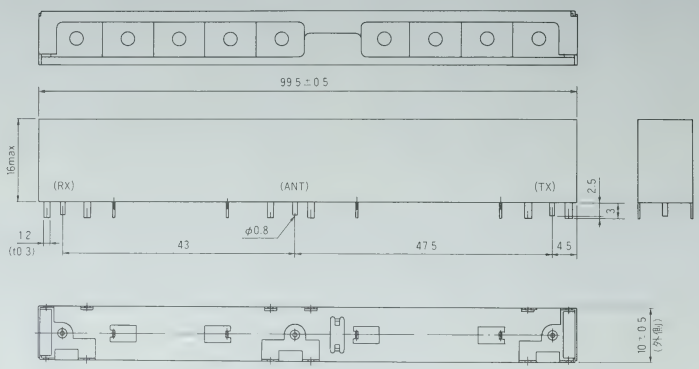
Part Number		Center Freq. (MHz)	Band width (MHz)	Insertion Loss in BW (dB) max.	Ripple in BW (dB) max.	VSWR in BW max.	Attenuation (dB) min.
DFY2R836CR881BFDA	Tx	836.5(F_T)	F_T±12.5	2.1	1.2	1.7	50(F_R±12.5)
	Rx	881.5(F_R)	F_R±12.5	3.0	1.5	1.7	53(F_T±12.5)
DFY2R888CR933BFDA	Tx	888.5(F_T)	F_T±16.5	2.8	1.8	1.8	45(F_R±16.5)
	Rx	933.5(F_R)	F_R±16.5	4.2	2.5	1.8	47(F_T±16.5)

DIMENSIONS

E-AMPS



E-TACS



(Unit : mm)

MICROWAVE FILTER

muRata

GIGAFIL® 800/900MHz BAND DUPLEXER

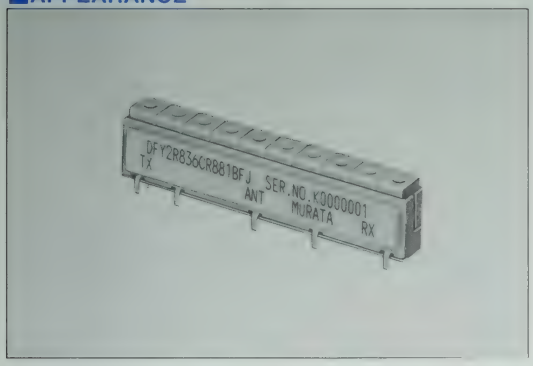
Suitable for Miniature Equipment !!

Low Loss, High Selectivity, High Performance Duplexer.

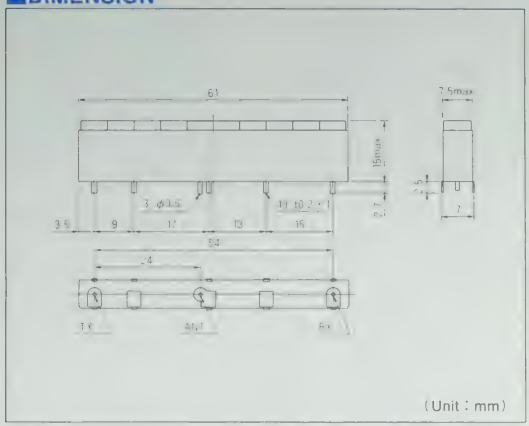
FEATURES

1. Small and light because of high dielectric constant ceramics.
2. Excellent temperature satbility because of the temperature compensated dielectric constant.

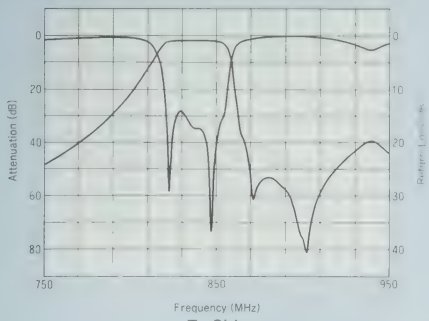
APPEARANCE



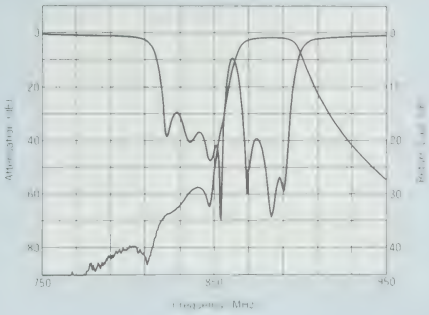
DIMENSION



TYPICAL CHARACTERISTICS



Tx Side



Rx Side

RATING

PERT NUMBER		CENTER FREQUENCY (MHz)	BAND WIDTH (MHz)	INSERTION LOSS IN BW (dB) MAX.	RIPPLE IN BW (dB) MAX.	VSWR IN BW MAX.	ATTENUTION (dB) MIN.
DFY2R836CR881BFJ	TX	836.5(F_T)	25	2.6(5~35℃) 2.9(−30~85℃)	0.9	1.8	45(F_R±12.5)
	RX	881.5(F_R)	25	3.3(5~35℃) 3.6(−30~85℃)	1.2	1.7	55(F_T±12.5)

※Please confirm the type and rated value upon ordering as they are subject to change for improvement without notice. Please contact us for further information.

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Phone 730-7605, 730-7321 Telex 25858

1991. 6. 6K

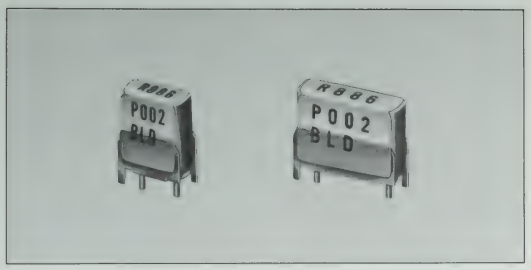
Bandpass Filter for 800/900MHz Band Cordless Telephones

Preliminary

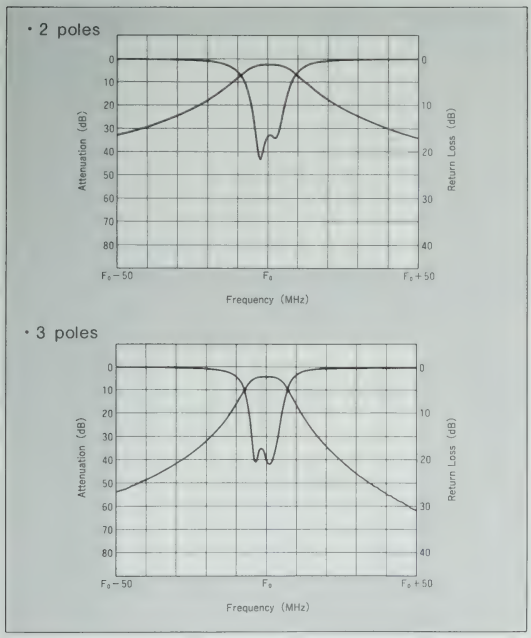
Suitable for Miniature Equipment.

■FEATURES

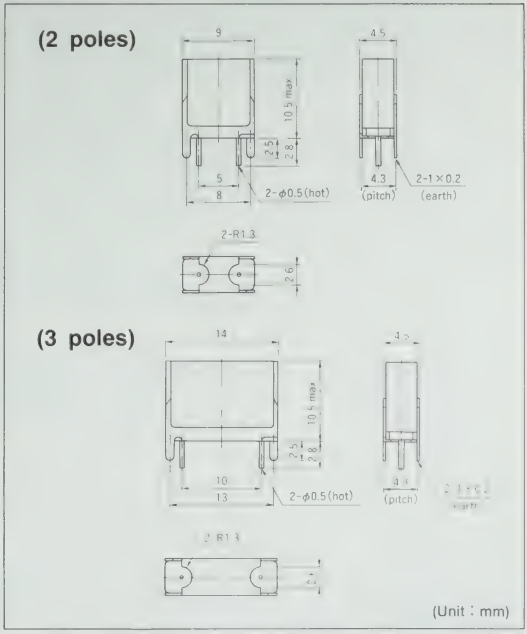
1. The use of high-Q dielectric resonators guarantees low insertion loss.
2. Small and light because of high dielectric constant ceramics (1/2 size of the current model.)
3. Excellent temperature stability because of the temperature compensated dielectric constant (0± 5ppm/℃ max).
4. Excellent mechanical stability.



■TYPICAL CHARACTERISTICS



■DIMENSIONS



■RATINGS

Part Number	Poles	Center Freq. Fo(MHz)	Band width (MHz)	Insertion Loss in BW (dB) max.	Ripple in BW (dB) max.	VSWR in BW max.	Attenuation (dB) min.
DFC2R886P002BLD	2	886.0	2.0	3.0	0.5	2.0	24 〔Fo±45〕
DFC2R931P002BLD		931.0					
DFC3R886P002BLD	3	886.0		5.3	0.5	2.0	45 〔Fo−45〕
DFC3R931P002BLD		931.0					55 〔Fo+45〕

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Phone:730-7605/730-7321 Telex:25858

1990. 10. 2K

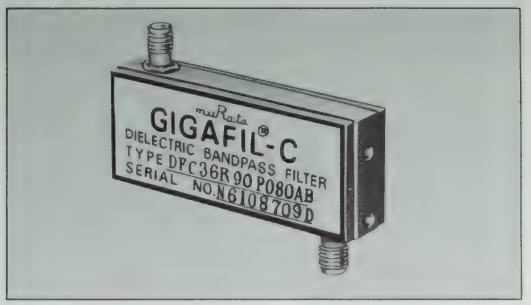
MICROWAVE FILTER

muRata

Dielectric Resonator Bandpass Filter GIGAFIL®-CA

"GIGAFIL®-CA" for Microwave Communications System

"Gigafil–CA" provides narrow band and low loss filters which are equivalent to the conventional invar cavity resonator filters in electrical performances. "Gigafil–CA" is compact and light. One of the biggest design policy of "Gifafil–CA" is to match them with the size of the electronics parts and related components which are becoming smaller and smaller. "Gigafil–CA" uses dielectric ring shaped resonators having excellent resonant characteristics; high temperature stability (within ± 3ppm/°C), low dissipation factor (Q ⩾ 7000 at 7GHz) and good spurious responses ($f_{spurious} \geqslant 1.3 f_0 f_0$). High dielectric constant (K ~ 38) of the resonator makes the total size of the filter much smaller (1/3 ~ 1/10) than the conventional cavity resonator filter. The most suitable applications of "Gigafil–CA" are for microwave repeater, broadcast equipment, aircraft receivers and tranceivers, and satellite communications system.



■ FEATURES

1. Extremely low loss (nearly equivalent to cavity resonator filter)
2. Excellent temperature stability (comparable to invar cavity filter)
3. Small and light
4. A large transmission power
5. Small transmission distortion

■ PART NUMBERING (※Please specity the part numder when ordering.)

DFC	5	6R90	P	075	A	B	

Classification of Product

DFC: Microwave filter with coaxial connector

Number of Section

5

Center Frequency (GHz)

Examples

Center Frequency	Numbering
6.903 GHz	6R90
8.538 GHz	8R53
10.532 GHz	10R5
11.538 GHz	11R5
12.538 GHz	12R5

Decimal points is expressed by symbol R

Transmission Characteristic

P: Bandpass

Bandwidth (MHz)

Examples

Bandwidth	Numbering
75	075
75.3	075
125.8	125

Classification of Resonator

A: $TE_{01}\delta$ Dielectric Resonator

Classification and Position of Input and Output Connector

Classification** of Connector		Position of Connector	
Input	Output	GIGAFIL	GIGAFIL
SMA-J	SMA-J	A	B
SMA-J	SMA-P	E	F
SMA-P	SMA-J	J	K
SMA-P	SMA-P	N	P

**N type connectors in stead of SMA for the filter with center frequency less than 2.33GHz.

Other Specification Symbol

MICROWAVE FILTER

muRata

Dielectric Resonator Bandpass Filter GIGAFIL®-CA

■ CONSTRUCTION

Resonator	Dielectric ring shaped resonator ($TE_{01}\delta$)
Casing	Aluminum
Connector	SMA (f_0>2.33GHz), N(f_0≤2.33GHz)

■ RATING

Char. Impedance	50 Ω
Response	0.01 dB Ripple Chebyschev
Operating Temp.	-30°C ~ +60°C
Storage Temp.	-55°C ~ +85°C

■ ENVIRONMENTAL PERFORMANCE

Vibration	MIL-STD-202, 204, A
Shock	MIL-STD-202, 213, A
Humidity	MIL-STD-202, 103, B
Heat Shock	MIL-STD-202, 107, A

■ ELECTRICAL PERFORMANCE

Center Freq. (f_0)	1.0 GHz ~ 12.4 GHz
Number of Section (n)	n = 3, 4, 5, 6, 7
Bandwidth Ratio (w)	0.002 ~ 0.013 (n = 3) 0.002 ~ 0.015 (4 ≤ n ≤ 7)
Insertion Loss	See page 2
Amplitude Deviation in Passband	See page 3
V. S. W. R.	≤ 1.2 within 0.9 x w
Group Delay	See page 4
Attenuation	See page 3
Selectivity	> 50 dB
Input Power	See page 5
Temp. Stability of Center Frequency	± 3 ppm / °C
Spurious Response	> 40 dB (D.C. ~ f_0 x 1.3)

■ INSERTION LOSS AT F_0 AND AMPLITUDE DEVIATION IN PASSBAND

1. Insertion Loss at Center Frequency

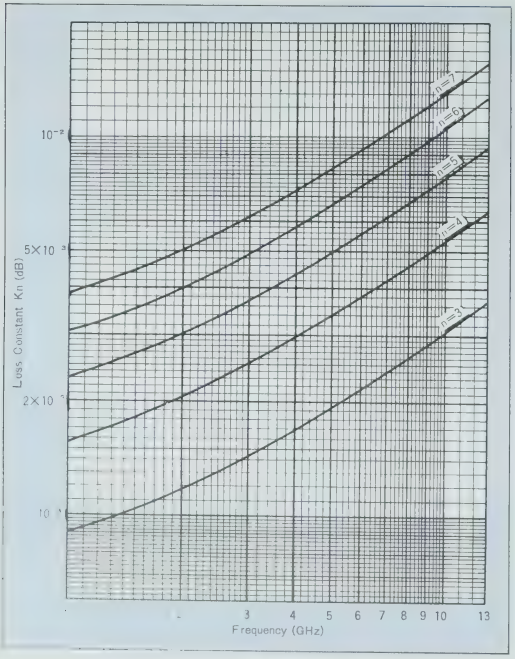


Fig. 1 Loss Constant

Bandwidth ratio* w is defined by the next equation using upper limit and lower limit frequencies of passband edge and center frequency

$$w \equiv (f_2 - f_1)/f_0$$

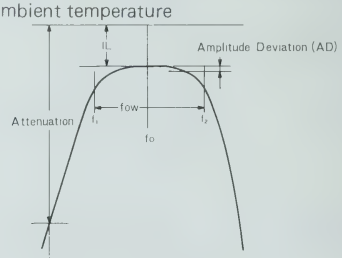
Insertion loss specification of the filter at the center frequency is expressed by the next equation (at room temperature) (Kn: See Fig.1)

$$IL \leq \left[\frac{Kn}{w} + (0.1 \cdot w^{0.35} + 0.04)\sqrt{f_0\,(GHz)}\right] \cdot 1.1 + 0.1 \quad (dB)$$

At arbitrary temperature, IL specification is modified as follows:

$$IL(Ta) = [1 + (Ta - 25) \cdot 1.9 \times 10^{-3}] \cdot IL(25^\circ C)(dB)$$

Ta: Ambient temperature



Example:

A 4 section with center frequency of 6.4 GHz and a bandwidth of 64 MHz would have:

$$IL = \left[\frac{4 \times 10^{-3}}{0.01} + (0.1 \times 0.01^{0.35} + 0.04)\sqrt{6.4}\right] \times 1.1 + 0.1$$

$$= 0.71 dB$$

* Bandwidth (f_0w) of the filter should be larger in general about 10% or more than the bandwidth of RF signal to be transmitted.

2. Amplitude Deviation in Passband (at 25°C)

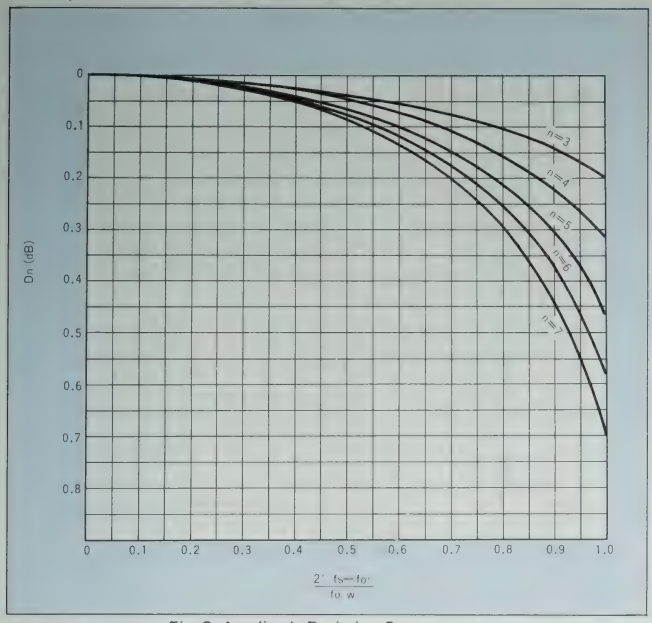


Fig. 2 Amplitude Deviation Curves

The insertion loss of the filter in passband shows larger value as the signal frequency is away from f_0 or as the bandwidth ratio is smaller.
Amplitude deviation in passband (AD) is defined by the following equation.

$$AD(f_s) \equiv IL(f_s) - IL(f_0)$$

where, f_s is arbitrary signal frequency within pass band. The specification of amplitude deviation is expressed as

$$AD(f_s) \leqslant Dn(f_s)\frac{Kn}{w} + 0.1\ (dB)(f_1 \leqslant f_s \leqslant f_2)$$

where $Dn(f_s)$ is drawn in Fig. 2 and Kn in Fig. 1.

Example: Given: f_0 = 6.4 GHz
w = 0.01
n = 4

Find: Maximum amplitude deviation at f_s = 6.425 GHz

$$\frac{2|f_s - f_0|}{f_0 w} = \frac{2|6.425 - 6.4|}{6.4 \times 0.01} = 0.78$$

Using 4-section curve in Fig. 2
we find Dn = 0.15
Kn in Fig. 1 = 4×10^{-3}

Maximum amplitude deviation $= 0.15 \times \frac{4 \times 10^{-3}}{0.01} + 0.1 = 0.16$ dB

■ STOPBAND ATTENUATION

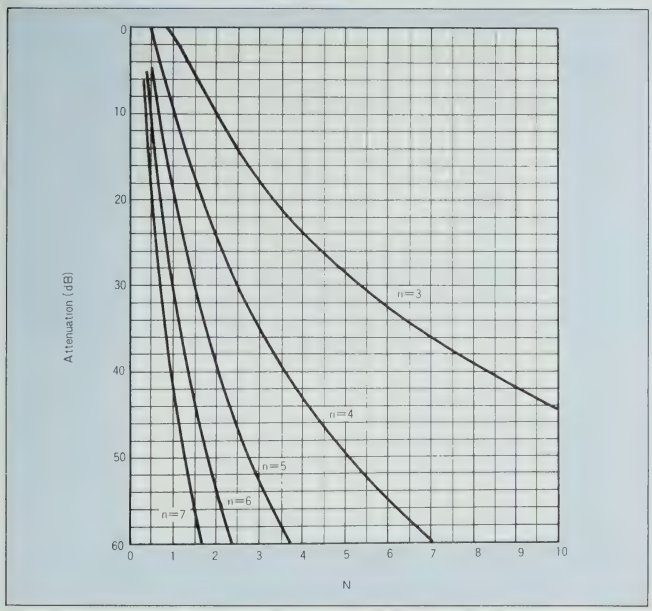


Fig. 3 Stopband Attenuation Curves

Fig. 3 defines the normal specification limits of the stopband attenuation. Horizontal scale N in Fig. 3 is given by the following equation.

$$N = \frac{2|f - f_0|}{f_0 w(1+\delta)} - 1$$

where δ is defined by the next equation

$$\delta = \frac{f - f_0}{f_0}[0.76 - 0.51 \log (w/1.55)] \quad (f < f_1)$$

$$\delta = 4.8\frac{f - f_2}{f_0} + \frac{f - f_0}{f_0}[0.76 - 0.51 \log(w/1.55)] \quad (f > f_2)$$

Example:
Given: f_0 = 6.4 GHz
w = 0.01
n = 4

Find: Minimum attenuation levels at 6.2 GHz.

$$\delta = \frac{6.2-6.4}{6.4}[0.76-0.51\log(0.01/1.55)] = -0.058$$

$$N = \frac{2|6.2-6.4|}{0.01 \times 6.4(1-0.058)} - 1 = 5.64$$

Using the 4-section curve at the point 5.64 we find the minimum level of attenuation being 53 dB.

■ GROUP DELAY

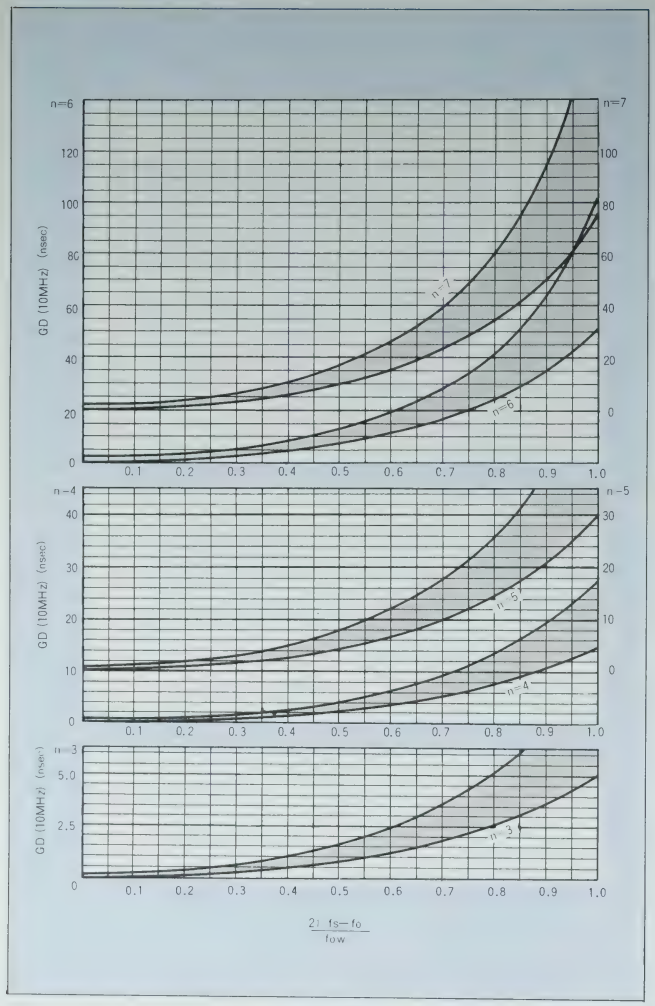


Fig. 4 Group Delay

GD is defined by the following equation

$$GD \equiv \left(\frac{d\theta}{d\omega}\right)_{f_s} - \left(\frac{d\theta}{d\omega}\right)_{f_0}$$

where θ is phase difference of signal frequency between input and output ports of the filter. We find GD directly from Fig. 4 when bandwidth is 10MHz. When bandwidth is not 10MHz, we can calculate GD as follows:

$$GD(f_0 w) = \frac{0.01}{f_0 w} GD(10MHz) \qquad \text{(nsec)}$$

Example:

Given: $f_0 = 6.4$ GHz
$w = 0.01$
$n = 4$

Find: Maximum and Minimum value of GD at $f_s = 6.425$ GHz

$$\frac{2|f_s - f_0|}{f_0 w} = 0.78$$

Using 4-section curve in Fig. 4 at 0.78 We find that the values of GD are 1.9 and 1.1 nsec respectively.

■ INPUT POWER

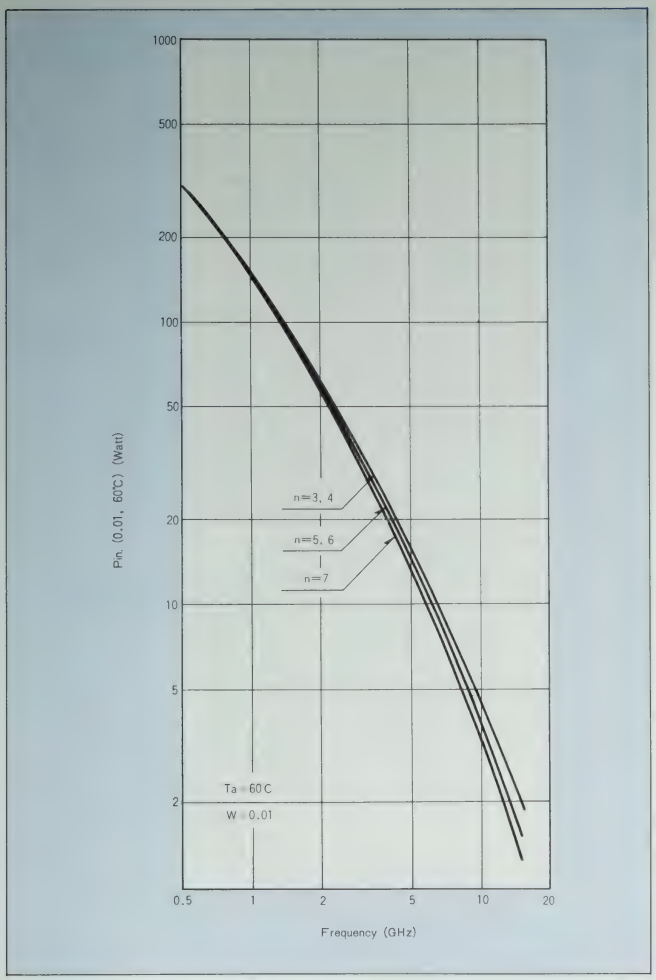


Fig. 5 Max. Input Power

A maximum input power *Pin* can be obtained from Fig.5. under condition W=0.01 and Ta=60°C. A maximum input power corresponding to a given temperature can be calculated by the following equation using a maximum input power *Pin* shown in Fig. 5.

$$Pin(w;Ta)=1.54(125-Ta)\cdot w\cdot Pin(0.01;60^{\circ}C)\,(\text{Watt})$$

Ta; Ambient temperature

Example

Given: f_0 = 7.3 GHz
w = 0.016
n = 5

Find: Maximum input power at 50° C
Using 5 section curve in Fig. 5 at 7.3 GHz
Pin(0.01;60° C)=7.1 Watt
We can calculate maximum input power
Pin (0.016; 50° C) = 1.54 x (125–50) x 0.016 x 7.1 = 13.1 Watt

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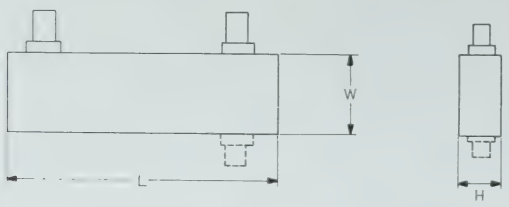
■ DIMENSIONS

No.	Applicable Frequency (GHz)	W (mm)	H (mm)	L (mm*)				
				A	B	C	D	E
1	$1.00 \leqslant f_0 \leqslant 1.17$	104	73	435	580	730	880	1025
2	$1.17 < f_0 \leqslant 1.41$	88	62	365	485	610	735	855
3	$1.41 < f_0 \leqslant 1.66$	72	54	305	405	510	615	715
4	$1.66 < f_0 \leqslant 1.97$	64	45	255	345	430	515	605
5	$1.97 < f_0 \leqslant 2.33$	54	40	215	290	365	435	510
6	$2.33 < f_0 \leqslant 2.75$	48	36	184	250	310	370	430
7	$2.75 < f_0 \leqslant 3.22$	42	30	160	215	270	320	375
8	$3.22 < f_0 \leqslant 3.85$	38	27	136	181	230	275	315
9	$3.85 < f_0 \leqslant 4.50$	34	19.5	117	155	192	230	270
10	$4.50 < f_0 \leqslant 5.40$	30	17.5	101	133	166	198	230
11	$5.40 < f_0 \leqslant 6.50$	26	15	86	112	139	165	192
12	$6.50 < f_0 \leqslant 7.70$	24	13.5	74	96	119	141	163
13	$7.70 < f_0 \leqslant 8.70$	22	12.5	65	85	104	124	143
14	$8.70 < f_0 \leqslant 10.30$	20	11.0	57	74	91	108	124
15	$10.30 < f_0 \leqslant 12.40$	19	10	49	63	77	91	105

* Rank A, B, C, D, E is found in Table 2.



Dimension (mm)	Tolerance (mm)
1 ~ 4	±0.3
4 ~ 16	±0.5
16 ~ 63	±0.7
63 ~ 250	±1.0
250 ~ 1000	±1.5
1000 ~ 2000	±2.0

Table 1

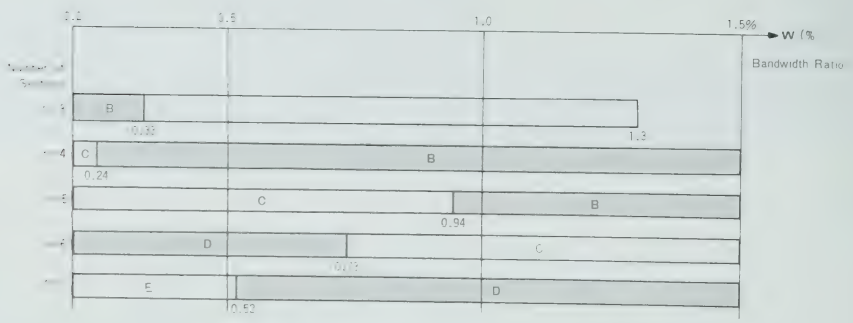


Table 2 Find the rank from both number of sections and bandwidth ratio and apply it to Table 1 which determines the total length.

MICROWAVE FILTER

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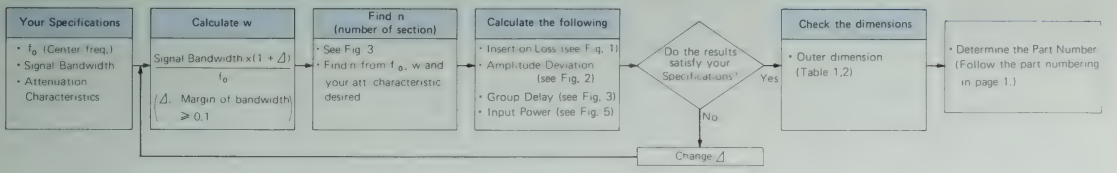
Dielectric Resonator Bandpass Filter GIGAFIL®-CA

■ ORDERING INFORMATION

Before ordering, follow the steps below to check all specifications you need.

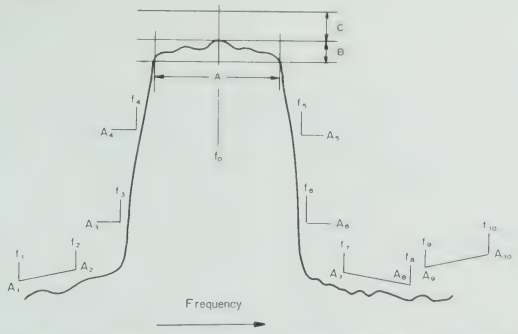


When you order, specify the center frequency and the bandwidth together with the part number.
When any of your specifications is not satisfied, fill out the inquiry form below and contact with our sales office.

INQUIRY FORM

1. Model Number		DFC□□R□□P□□□A
2. Center Frequency (f_0)		MHz
3. Section Number		
4. Bandwidth Ⓐ		MHz
5. Amplitude Devidtion within Passband Ⓑ		dB Max.
6. Insertion Loss (at f_0) Ⓒ		dB Max.
7. VSWR within passband		Max.
8. Group Delay within passband		n sec. Max.
9. Attenuation Characteristics	A_1 dB at f_1	dB Min. at MHz
	A_2 dB at f_2	dB Min. at MHz
	A_3 dB at f_3	dB Min. at MHz
	A_4 dB at f_4	dB Min. at MHz
	A_5 dB at f_5	dB Min. at MHz
	A_6 dB at f_6	dB Min. at MHz
	A_7 dB at f_7	dB Min. at MHz
	A_8 dB at f_8	dB Min. at MHz
	A_9 dB at f_9	dB Min. at MHz
	A_{10} dB at f_{10}	dB Min. at MHz
10. Input and Output Connector		
11. Operating temp.		
12. Dimensions (L×W×T)		

Attenuation



Other Remarks

MICROWAVE FILTER

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Dielectric Resonator Bandpass Filter GIGAFIL®-CA

※Please confirm the type and rated value upon ordering as they are subject to change for improvement without notice. Please contact us for further information.

muRata MURATA MFG.CO.,LTD.

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INTERNATIONAL DIVISION
5-1-1 Hakusan, Midori-ku, Yokohama-shi, Kanagawa 226, JAPAN Phone:045-931-7111 Telex:J 47925 MURATAT

〈U.S.A./CANADA〉 **MURATA ERIE NORTH AMERICA, INC.**
2200 Lake Park Drive Smyrna, GA 30080, U.S.A.
Phone:404-436-1300 Telex:542929

MURATA ERIE NORTH AMERICA, LTD. Canadian Operations
5 Fraser Avenue Trenton Ontario Canada K8V 5S1
Phone:613-392-2581 Telex:662279

〈MEXICO〉 **MURATA ERIE TEXAS, INC.**
27 Concord Street, El Paso, TX79906 U.S.A. Phone:915-778-0217

MURATA ELECTRONICA MEXICANA S.A. de C.V
Santos Dumont #6620 Parque Industrial Panamericano CD.
Juarez, Chihuahua 32000 Mexico Phone:1619-0809

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MURATA AMAZÔNIA INDUSTRIA E COMERCIO LTDA.
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Parc Technologique 18, 22, Avenue Edouard Herriot 92356
Le Plessis Robinson Cedex France Phone:1-40941400 Telex:631530

〈ITALY〉 **MURATA ELETTRONICA S.p.A.**
Via Sancarlo, 1 20040 Caponago, Milano Phone:02-95743000 Telex:330385

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41 Jalan Pemimpin, Off Upper Thomson Road, Singapore 2057
Phone:2584233, Telex:21127

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225 Chung-Ching Road Taichung, Taiwan Phone:042-91-4151 Telex:27571 MURATA

MURATA ERIE N.A., INC. Taiwan Branch
Room 1403, Chia Hsin Building 96, Chung-Shan N. Rd., Sec. 2, Taipei 10449, Taiwan
Phone:02-562-4218 Telex:27571 MURATA

〈THAILAND〉 **MURATA ELECTRONICS, LTD.**
Northern Region Industrial Estate 63 Moo 4, Tambol Ban-Klang Amphoe Muang, Lamphun 51000 Kingdom of Thailand
Phone:053-581166

〈HONG KONG〉 **MURATA COMPANY, Limited**
Units 1314-22, 13F Park-In Commercial Centre 56 Dundas Street Mongkok, Kowloon Hong Kong
Phone:3-7822618 Telex:56208 HKMART HX

〈KOREA〉 **MURATA MFG. CO., LTD.** Seoul Branch
Room 906, Lee Ma Bldg., 146-1, Susong Dong, Chongro-Ku, Seoul, Korea
Phone:730-7605/730-7321 Telex:25858

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MICROWAVE OSCILLATOR

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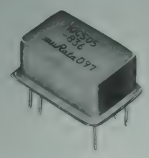
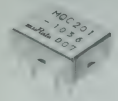
Microwave Oscillator V.C.O. MQC500/300/200 Series



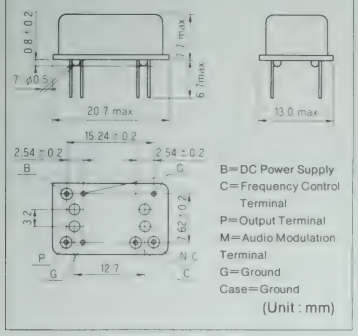
MQC500

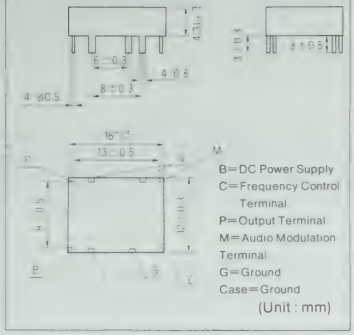
MQC300

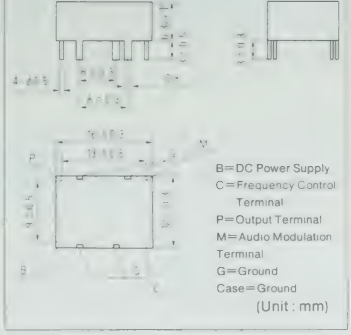


MQC200

DIMENSIONS







FEATURES

1. These small,lightweight oscillators help compact equipment design.
2. Low power consumption is available.
3. Excellent temperature stability.

PART NUMBERING (※PLease specify the part number when ordering.)

(Ex.) M Q C 5 0 5 — 8 3 6

❶ ❷ ❸

❶Denotes VCO
❷Type Code
❸Oscillation Frequency (Center Frequency in MHz)

APPLICATIONS

- Mobil・Hand Held Telephone
- Cordless Telephone (European)
- Personal Radio
- MCA Radio

MICROWAVE OSCILLATOR

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Microwave Oscillator V.C.O. MQC500/300/200 Series

SPECIFICATIONS

Mobile・Hand Held Telephone

AMPS

Application	Part Number	Oscillation Frequency (MHz)	Control Volt. Sensitivity (MHz/V)	Tuning Volt. Range (V)	Audio Modulation Sensitivity (KHz/Vp-p)	Audio Modulation Sensitivity Deviation (% max.)	C/N (dBmin.)	S/N (dBmin.)	Operation Temperature (℃)
Tx	MQC505-836	836.5±12.5	11±2	1.0～4.0	8～12	±10	72	45	-35～+80
	MQC508-836	836.5±12.5	7±1.5	1.0～6.0	8～12	±10	75	50	-35～+80
	MQC514-836	836.5±12.5	11±2	1.0～4.0	8～12	±10	75	50	-35～+80
	MQC309-836	836.5±12.5	11±2	1.0～4.0	8～12	±10	70	45	-35～+80
Rx	MQC505-926	926.5±12.5	11±2	1.0～4.0	—	—	72	45	-35～+80
	MQC505-964	964.5±12.5	11±2	1.0～4.0	—	—	72	45	-35～+80
	MQC508-926	926.5±12.5	9±1.5	2.0～6.0	—	—	75	45	-35～+80
	MQC508-964	964.5±12.5	7±1.5	1.0～6.0	—	—	75	50	-35～+80
	MQC514-926	926.5±12.5	11±2	1.0～4.0	—	—	75	50	-35～+80
	MQC309-926	926.5±12.5	11±2	1.0～4.0	—	—	70	45	-35～+80
	MQC309-964	964.5±12.5	11±2	1.0～4.0	—	—	70	45	-35～+80

＊Supply Voltage 5±0.25V (MQC508=7.2±0.3V, MQC514=7.0±0.5V) Output Level -2dBm min. (MQC508=0dBm min.)
Power Consumption. 8mA max. (MQC508=12mA max.)

ETACS

Application	Part Number	Oscillation Frequency (MHz)	Control Volt. Sensitivity (MHz/V)	Tuning Volt. Range (V)	Audio Modulation Sensitivity (KHz/Vp-p)	Audio Modulation Sensitivity Deviation (% max.)	C/N (dBmin.)	S/N (dBmin.)	Operation Temperature (℃)
Tx	MQC505-888	888.5±16.5	13±2	1.0～4.0	8～12	±10	72	45	-35～+80
	MQC508-888	888.5±16.5	9±2	1.0～6.0	8～12	±10	75	50	-35～+80
	MQC309-888	888.5±16.5	13±2	1.0～4.0	8～12	±10	70	45	-35～+80
Rx	MQC505-978	978.5±16.5	13±2	1.0～4.0	—	—	72	45	-35～+80
	MQC508-978	978.5±16.5	9±2	1.0～6.0	—	—	75	50	-35～+80
	MQC508-1024	1024.5±16.5	9±2	1.0～6.0	—	—	75	50	-35～+80
	MQC309-978	978.5±16.5	13±2	1.0～4.0	—	—	70	45	-35～+80

＊Supply Voltage 5±0.25V (MQC508=7.2±0.5V) Output Level -2dBm min. (MQC508=0dBm min.)
Power Consumption. 8mA max. (MQC508=12mA max.)

NMT

Application	Part Number	Oscillation Frequency (MHz)	Control Volt. Sensitivity (MHz/V)	Tuning Volt. Range (V)	Audio Modulation Sensitivity (KHz/Vp-p)	Audio Modulation Sensitivity Deviation (% max.)	C/N (dBmin.)	S/N (dBmin.)	Operation Temperature (℃)
Tx	MQC505-902	902.5±12.5	11±2	1.0～4.0	8～12	±10	72	45	-35～+80
	MQC508-902	902.5±12.5	7±1.5	1.0～6.0	8～12	±10	75	45	-35～+80
	MQC202-902	902.5±12.5	11±2	1.0～4.0	8～12	±10	72	45	-35～+80
Rx	MQC505-992	992.5±12.5	11±2	1.0～4.0	—	—	72	45	-35～+80
	MQC505-1017	1017.5±12.5	11±2	1.0～4.0	—	—	72	45	-35～+80
	MQC508-992	992.5±12.5	7±1.5	1.0～6.0	—	—	78	45	-35～+80
	MQC202-992	992.5±12.5	11±2	1.0～4.0	—	—	72	45	-35～+80

＊Supply Voltage 5±0.25V (MQC508=7.2±0.3V) Output Level -2dBm min. (MQC508=0dBm min.)
Power Consumption. 8mA max. (MQC508=12mA max.)

MICROWAVE OSCILLATOR

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Microwave Oscillator V.C.O. MQC500/300/200 Series

NMT/DDI/CRP

Application	Part Number	Oscillation Frequency (MHz)	Control Volt. Sensitivity (MHz/V)	Tuning Volt. Range (V)	Audio Modulation Sensitivity (KHz/Vp-p)	Audio Modulation Sensitivity Deviation (% max.)	C/N (dBmin.)	S/N (dBmin.)	Operation Temperature (℃)
Tx	**MQC509-950**	950.0±10.0	10±2	1.0~4.0	8~12	±10	71	45	-35~+80
Rx	**MQC505-787**	787.5±12.5	11±2	1.0~4.0	—	—	75	50	-35~+80
	MQC505-801	801.5±13.5	12±2	1.0~4.0	—	—	72	45	-35~+80
	MQC508-801	800.0±17.0	9±2	1.0~6.0	—	—	75	48	-35~+80
	MQC509-730	730.0±10.0	10±2	1.0~4.0	—	—	75	45	-35~+80

*Supply Voltage 5±0.25V (MQC508=8.0±0.5V) Output Level -2dBm min. (MQC508=8±3dBm)
Power Consumption. 8mA max. (MQC508=35mA max.)

G.S.M

Application	Part Number	Oscillation Frequency (MHz)	Control Volt. Sensitivity (MHz/V)	Tuning Volt. Range (V)	Audio Modulation Sensitivity (KHz/Vp-p)	Audio Modulation Sensitivity Deviation (% max.)	C/N (dBmin.)	S/N (dBmin.)	Operation Temperature (℃)
Tx	**MQC505-902**	902.5±12.5	11±2	1.0~4.0	8~12	±10	72	45	-35~+80
	MQC309-902	902.5±12.5	11±2	1.0~4.0	8~12	±10	68	45	-35~+80
Rx	**MQC505-992**	992.5±12.5	11±2	1.0~4.0	—	—	72	45	-35~+80
	MQC505-1017	1017.5±12.5	11±2	1.0~4.0	—	—	72	45	-35~+80
	MQC309-992	992.5±12.5	11±2	1.0~4.0	—	—	68	45	-35~+80

*Supply Voltage 5±0.25V Output Level -2dBm min. Power Consumption. 8mA max.

Cordless(European)—CEPT40, CEPT80(Analog)/CT-2(Digital)

Application	Part Number	Oscillation Frequency (MHz)	Control Volt. Sensitivity (MHz/V)	Tuning Volt. Range (V)	Audio Modulation Sensitivity (KHz/Vp-p)	Audio Modulation Sensitivity Deviation (% max.)	C/N (dBmin.)	S/N (dBmin.)	Operation Temperature (℃)
Tx	**MQC506-886**	886.0±1.0	4±2	1.5~3.5	8~12	±5	70	45	-10~+60
	MQC506-914	914.5±0.5	3.5±2	1.5~3.5	8~12	±5	70	45	-10~+60
	MQC506-931	931.0±1.0	4±2	1.5~3.5	8~12	±5	70	45	-10~+60
	MQC506-959	959.5±0.5	3.5±2	1.5~3.5	8~12	±5	70	45	-10~+60
	MQC513-716	716.0±12.5	12±2	1.0~4.0	5.6~8.4	±10	75	45	-10~+60
	MQC308-886	886.0±1.0	5±2	1.0~3.5	16~24	±5	66	45	-10~+60
	MQC308-931	931.0±1.0	5±2	1.0~3.5	16~24	±5	66	45	-10~+60
Rx	**MQC506-828**	828.0±2.0	4±2	1.0~4.0	—	—	70	45	-10~+60
	MQC506-856	856.5±1.5	4±2	1.5~3.5	—	—	70	45	-10~+60
	MQC506-989	989.0±2.0	4±2	1.0~4.0	—	—	70	45	-10~+60
	MQC506-1017	1017.5±1.5	4±2	1.5~3.5	—	—	70	45	-10~+60
	MQC513-860	860.65±7.35	8±2	1.0~4.0	—	—	70	45	-10~+60
	MQC308-827	827.9±1.0	5±2	1.0~3.5	—	—	68	45	-10~+60
	MQC308-872	872.9±1.0	5±2	1.0~3.5	—	—	68	45	-10~+60

*Supply Voltage 5±0.25V (MQC506-828/989=4.5±0.25V, MQC308=4.0±0.2V) Output Level -2dBm min. (MQC308=0±3dBm)
Power Consumption. 8mA max.
**Oscillation frequency and supply voltage can be changed upon request. Consult us for further informations.

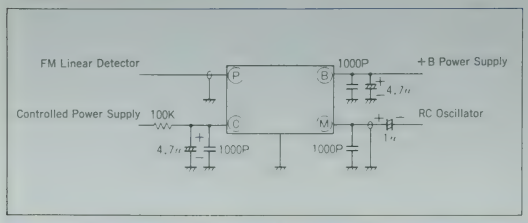
MICROWAVE OSCILLATOR

muRata

Microwave Oscillator V.C.O. MQC500/300/200 Series

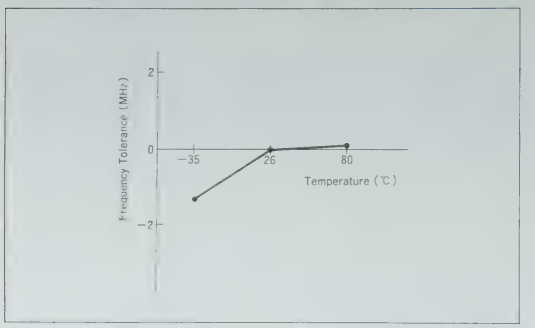
MEASURING CIRCUIT

• MQC500/300/200

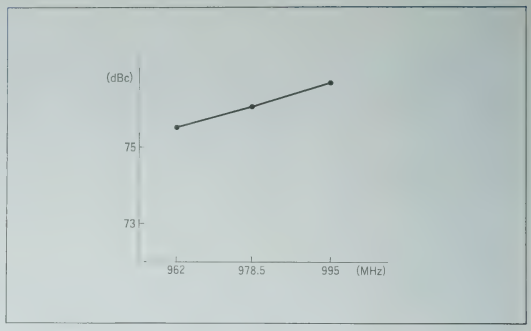


V.C.O. TYPICAL CHARACTERISTICS (MQC505-978)

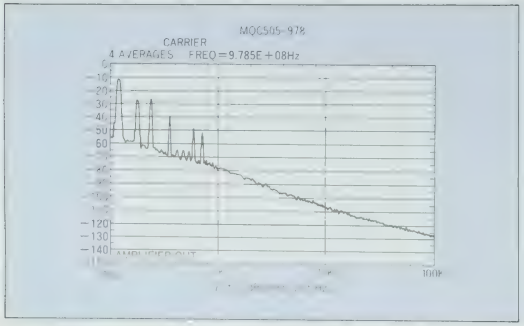
• Oscillation Frequency/ Tenperature Characteristics



• C/N Level - Oscillation Frequency



• C/N Level



※Please confirm the type and rated value upon ordering as they are subject to change for improvement without notice. Please contact us for further information

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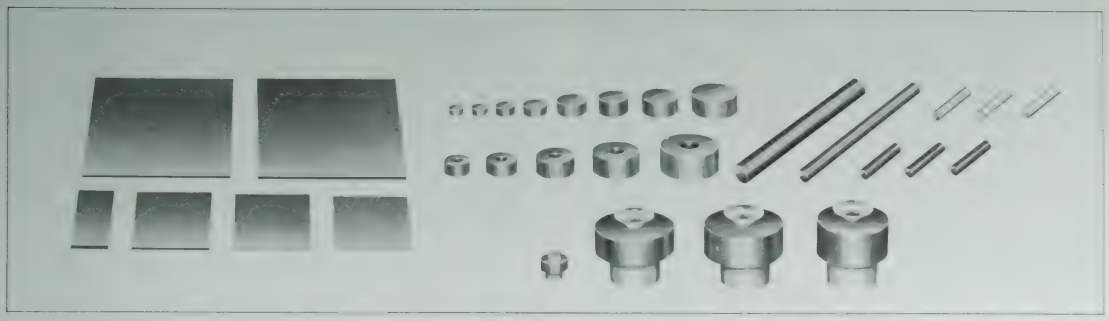
1991. 6. 7 K

RESOMICS®

muRata

Microwave Ceramic Components

Reduces the size of microwave devices
Low loss and high dielectric constant



FEATURES

1. High-purity, high-density ceramics minimize loss.
2. High dielectric constant makes possible the miniaturization of microwave circuits. Temperature-compensated dielectric constant enables stable microwave oscillators.
3. The high-purity and smooth surface of the ceramics make them ideal for MIC applications.
4. A variety of shapes are avaiable for custom application requirements.

SYSTEM APPLICATIONS

- TVRO (SHF TV Down Converters)
- Burglar alarms
- Multi-channel microwave communication system
- Radar system
- Speed guns
- Mobile phone system
- CATV converters
- Measuring equipment

CIRCUIT APPLICATION

- Microwave oscillators (DRO)
- MIC (Microwave Integrated Circuits)
- Discriminators
- Filters
- Tank circuits

ELECTRICAL AND PHYSICAL CHARACTERISTICS OF DIELECTRIC RESONATORS

Material Code	U	R	M	E	Z
Applications	Dielectric Resonator	Dielectric Resonator	Dielectric Resonator	Dielectric Resonator	Support
Dielectric Constant (εr)	36~40	29~31	37~39	36~40	6.4±0.6
Temp. Coefficient (ppm/℃)	τf^{*}=−4 ~10	τf^{*}= 0 ~ 6	τf^{*}= 0 ~ 6	τf^{*}= 0 ~ 6	$\tau \varepsilon^{*}$= 100±30
Q (=1/tan δ)	6000 min. (at 7GHz)	12000 min (at10GHz)	7000 min. (at 7GHz)	20000 min. (at10GHz)	2000 min. (at 7GHz)
Ins. Resistance (Ω・cm)	1×10^{13}min.	1×10^{13}min.	1×10^{13}min.	1×10^{14}min.	1×10^{13}min.
Expansion coefficient (ppm/℃)	6~7	10.7	6~7	10.7	~10
Thermal Conductivity (cal/cm·Sec·℃)	0.0046	0.0051	0.0046	0.0077	0.0042
Specific Heat (cal/g·℃)	0.15	0.050	0.15	0.077	0.20
Density (g/cm3)	5.0	7.7	5.0	7.5	2.7
Water Absorption (%)	0.01 max.	0.01 max.	0.01 max.	0.01 max.	0.01 max.
Vicker's Hardness Number	900	700	900	800	800
Bend Strength (kg/cm)	1000	900	1000	1200	1500

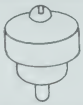
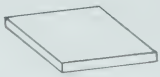
※ τf denotes temperature coefficient of resonant frequency and $\tau \varepsilon$ denotes temperature coefficient of dielectric constant

■ELECTRICAL AND PHYSICAL CHARACTERISTICS OF DIELECTRIC SUBSTRATES

Material Code	H	P	K
Dielectric Constant (εr)	38±1	21.4±1	91±3
Temp. Coefficient (ppm/℃)	τε*=−30±30	τε*=−30±30	τε*=−30±30
Q (=1/tan δ)	8000 min. (at 3GHz)	9000 min. (at 3GHz)	1000min. (at 3GHz)
Ins. Resistance (Ω·cm)	1×10^{13}min.	1×10^{13}min.	1×10^{13}min.
Expansion coefficient (ppm/℃)	6~7	8~9	8~9
Thermal Conductivity (cal/cm·Sec·℃)	0.0046	0.0170	0.0039
Specific Heat (cal/g·℃)	0.15	0.20	0.13
Density (g/cm3)	5.0	3.7	5.7
Water Absorption (%)	0.01 max.	0.01 max.	0.01 max.
Vicker's Hardness Number	900	800	700
Bend Strength (kg/cm)	1000	1500	1500

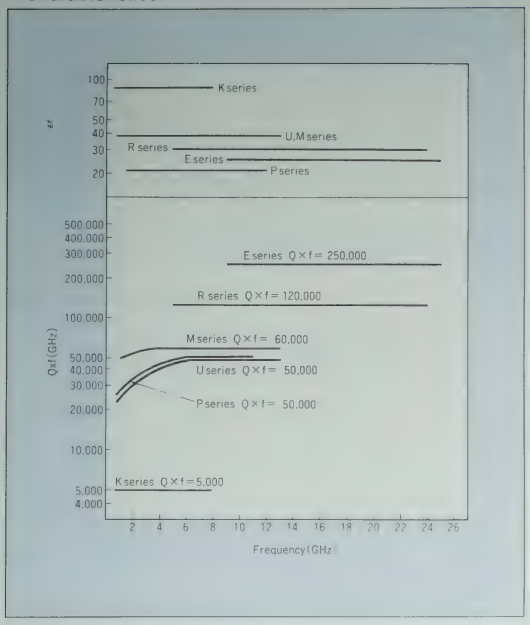
※τε denotes temperature coefficient of dielectric constant.

■DIELECTRIC ELEMENT/CONFIGURATION

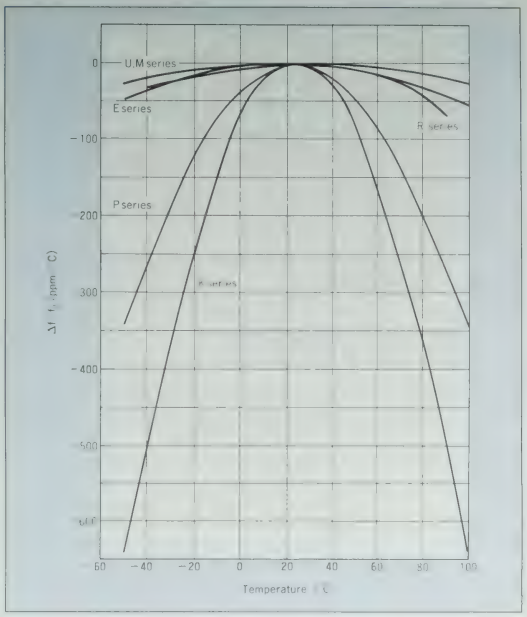
Kind	Types	Configuration	Features and Applications
Dielectric Resonator (RESOMICS)	DRD	Disc	Disc type with simple configuration. Used for stabilizing frequency in microwave oscillators.
	DRT	Coaxial Cylinder	The resonator with a hole improves spurious response without degrading Q. It can be mounted using a screw.
	DRA	Coaxial Type with Support 	Coaxial resonator with DRZ support and mounting screw. The resonator's Q is not influenced by metal case.
Dielectric Substrate	DBR	Substrate 	High dielectric constant and high Q reduces the size of MIC.Three grades of surface finish are available.
Dielectric Rod	DAD	Rod	High Q bars and rods permit temperature coeffient and resonant frequency adjustment, in waveguide resonators and MIC's without degrading electrical characteristics.
	DAR	Bar	
Support	DRZ	Coaxial Cylinder	The support, which has a low dielectric constant and high Q, minimizes induced losses to the resonator.

CHARACTERISTICS

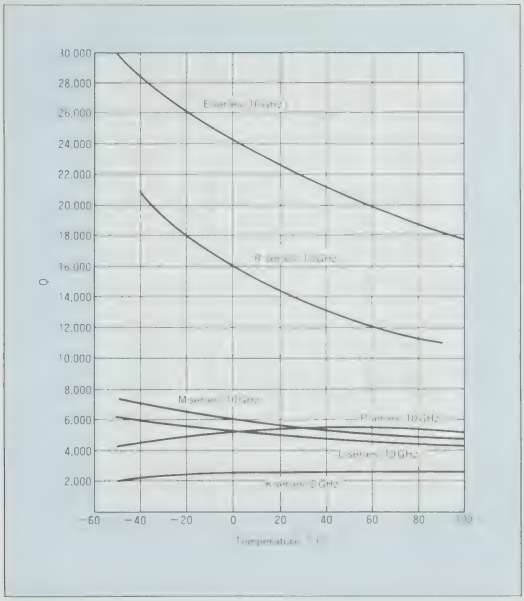
● Dielectric Constant and Q of Frequency Characteristics.



● Resonant Frequency of Temperature Characteristics.



● Q of Temperature Characteristics.



RESOMICS®

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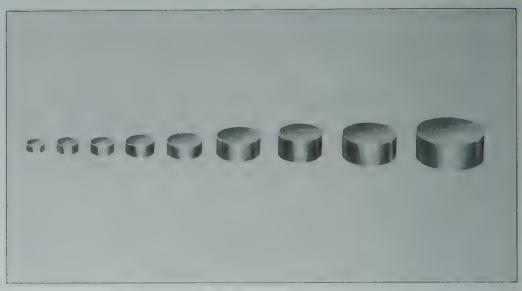
Dielectric Resonator U Series (DRD Type)

FEATURES

1. A low loss ceramic with a high dielectric constant ($\varepsilon r \fallingdotseq 38$) has made these compact, high Q, dielectric resonators possible.
2. The resonant frequency temperature coefficient can be chosen from -4 to 10ppm/℃. Tolerance of the frequency temperature coefficient can be chosen from ±0.5, ±1 and ±2 ppm/℃.
3. Accurate and repeatable dielectric constant simplifies circuit designing.
4. Resonant frequency can be chosen from 1.6 to 12GHz.



PART NUMBERING

※Please specify the part number when orderimg.

(Ex.) DRD 055 U E 024 A
❶ ❷ ❸ ❹ ❺ ❻

❶Configuration : DRD denotes disc type RESOMICS.
❷Outer Diameter : Outer diameter is designated in units of 1/10mm using 3 digits.
❸Material : U designates the kind of material.
❹Characteristic Code : The temperature coefficient of the resonant frequency is designated by the codes shown in Table 1.
❺Thickness : Thickness is designated in units of 1/10mm using 3 digits.
❻Special Code : The temperature coefficient tolerance of the resonant frequency is denoted by the codes shown in Table 2.

Table 1. Characteristic codes and electrical specifications

Characteristic Code	Frequency Temperature Coefficient (τf) (ppm/℃)	Dielecrtic Constant (εr)	Q (at 7GHz)
A	−4	36.6±0.5	6000 min.
B	−2	37.0±0.5	
C	0	37.4±0.5	
D	2	37.7±0.5	
E	4	38.0±0.5	
F	6	38.3±0.5	
G	8	38.6±0.5	
H	10	38.9±0.5	

Frequency characteristic of Q value

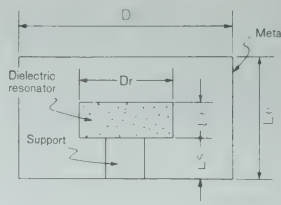
$$Q = \frac{100,000}{2.0 \times fo + 2.6}$$

fo : [GHz]

Table 2. Special codes

Special Code	Tolerance of the frequency Temperature Coefficient
No code	±2
A	±1
B	±0.5

TEST SET-UP OF RESOMICS



get the resonant frequency of the rating when Lo/Lr=Do/Dr=3.

RATINGS

Part Number	Dr±0.05 (mm)	Lr±0.05 (mm)	Resonance Frequency (GHz)
DRD046U□021	4.65	2.06	11.46~12.45
DRD051U□022	5.06	2.24	10.54~11.46
DRD055U□024	5.50	2.44	9.69~10.54
DRD060U□027	5.98	2.65	8.91~ 9.69
DRD065U□029	6.50	2.88	8.20~ 8.91
DRD071U□031	7.07	3.14	7.54~ 8.20
DRD077U□034	7.69	3.41	6.93~ 7.54
DRD084U□037	8.36	3.71	6.38~ 6.93
DRD091U□040	9.09	4.03	5.87~ 6.38
DRD099U□044	9.88	4.38	5.40~ 5.87
DRD107U□048	10.75	4.77	4.96~ 5.40
DRD117U□052	11.68	5.18	4.56~ 4.96
DRD127U□056	12.70	5.63	4.20~ 4.56
DRD138U□061	13.81	6.13	3.86~ 4.20
DRD150U□067	15.02	6.66	3.55~ 3.86
DRD163U□072	16.33	7.24	3.27~ 3.55
DRD178U□079	17.76	7.88	3.00~ 3.27
DRD193U□086	19.31	8.56	2.76~ 3.00
DRD210U□093	21.00	9.31	2.54~ 2.76
DRD228U□101	22.83	10.13	2.34~ 2.54
DRD248U□110	24.82	11.01	2.15~ 2.34
DRD270U□120	26.99	11.97	1.98~ 2.15
DRD293U□130	29.35	13.02	1.82~ 1.98
DRD319U□142	31.91	14.15	1.67~ 1.82
DRD347U□154	34.70	15.39	1.54~ 1.67

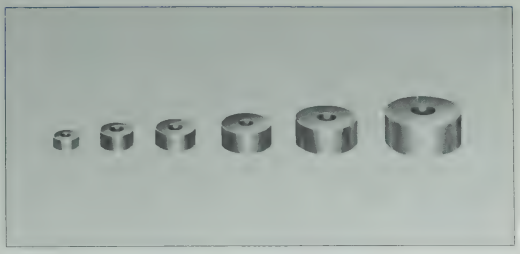
RESOMICS®

muRata

Dielectric Resonator U Series (DRT Type)

FEATURES

1. A low loss ceramic with a high dielectric constant ($\varepsilon r \fallingdotseq 38$) has made these compact, high Q, dielectric resonators possible.
2. The resonant frequency temperature coefficient can be chosen from -4 to 10ppm/℃. Tolerance of the frequency temperature coefficient can be chosen from ±0.5, ±1 and ±2 ppm/℃.
3. Accurate and repeatable dielectric constant simplifies circuit designing.
4. The hole in the center improves spurious response above that of the DRD series.
5. Any of the DRT series can be mounted with a plastic screw in combination with a DRZ support.



PART NUMBERING

※Please specify the part number when ordering.

(Ex.) DRT 055 U 020 C 024 B
❶ ❷ ❸ ❹ ❺ ❻ ❼

❶Configuration : DRT denotes coaxial cylindrical RESOMICS.
❷Outer Diameter : Outer diameter is designated in units of 1/10mm using 3 digits.
❸Material : U designates the kind of material.
❹Inner Diameter : Inner diameter is designated in units of 1/10mm using 3 digits.
❺Characteristic Code : The temperature coefficient of the resonant frequency is designated by the codes shown in Table 3.
❻Thickness : Thickness is designated in units of 1/10mm using 3 digits.
❼Special Code : The temperature coefficient tolerance of the resonant frequency is denoted by the codes shown in Table 4.

Table 3. Characteristics codes and electrical specifications

Characteristic Code	Frequency Temperature Coefficient (τf) (ppm/℃)	Dielecrtic Constant (εr)	Q (at 7GHz)
A	−4	36.6±0.5	6000 min.
B	−2	37.0±0.5	
C	0	37.4±0.5	
D	2	37.7±0.5	
E	4	38.0±0.5	
F	6	38.3±0.5	
G	8	38.6±0.5	
H	10	38.9±0.5	

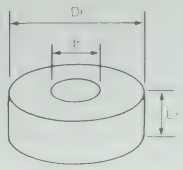
Frequency characteristic of Q value

$$Q \geqq \frac{100,000}{2.0 \times fo + 2.6}$$ fo : [GHz]

Table 4. Special codes

Special Code	Tolerance of the frequency Temperature Coefficient
No code	±2
A	±1
B	±0.5

EXTERNAL DIMENSIONS



get the resonant frequency of the rating when Lo/Lr=Do/Dr=3

RATINGS

Part Number	Dr±0.05 (mm)	dr±0.1 (mm)	Lr±0.05 (mm)	Frequency Range (GHz)
DRT051U020□022	5.06	2.0	2.24	10.54~11.45
DRT055U020□024	5.50		2.44	9.69~10.54
DRT060U020□027	5.98		2.65	8.91~ 9.69
DRT065U020□029	6.50		2.88	8.20~ 8.91
DRT071U020□031	7.07		3.14	7.54~ 8.20
DRT077U020□034	7.69		3.41	6.93~ 7.54
DRT084U030□037	8.36	3.0	3.71	6.38~ 6.93
DRT091U030□040	9.90		4.03	5.87~ 6.38
DRT099U030□044	9.88		4.38	5.40~ 5.87
DRT105U030□046	10.50		4.60	5.08~ 5.40
DRT107U040□048	10.75	4.0	4.77	4.96~ 5.08
DRT117U040□052	11.68		5.18	4.56~ 4.96
DRT127U040□056	12.70		5.63	4.20~ 4.56
DRT138U040□061	13.81		6.13	3.86~ 4.20
DRT150U040□067	15.02		6.66	3.55~ 3.86
DRT163U040□072	16.33		7.24	3.27~ 3.55
DRT178U040□079	17.76		7.88	3.00~ 3.27
DRT193U040□086	19.31		8.56	2.76~ 3.00
DRT200U040□086	20.00		8.63	2.67~ 2.89
DRT200U060□086	20.00	6.0	8.63	2.66~ 2.88

RESOMICS®

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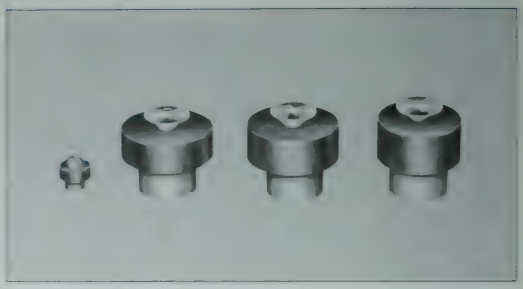
Dielectric Resonator U Series (DRA Type)

■FEATURES

1. DRA Dielectric Resonator Assemblies are a combination of :
   a) DRT Series RESOMICS®
   b) DRZ support
   c) Plastic Screw
2. The material is chosen to minimally affect resonant frequency and Q factor.



■PART NUMBERING

※Please specify the part number when ordering

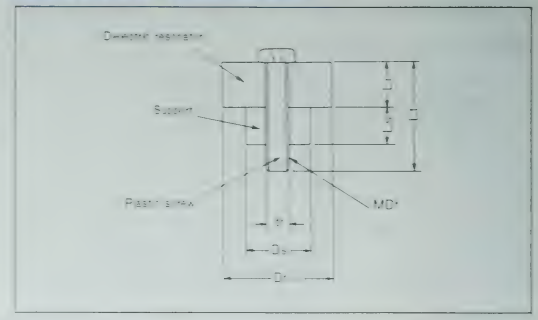
(Ex.) DRA001 D B
❶ ❷ ❸

❶Configuration : Denotes dimensions shown in the Rating Table below.

❷Characteristic Code : The temperature coeffient of the resonant frequency is designated by the codes shown in Table 5.

❸Special Code : The temperature coefficient tolerance of the resonant frequency is denoted by the codes shown in Table 6.

■EXTERNAL DIMENSIONS



■RATING

Part Number	Dielectric Resonator				Support		Plastic Screw			Resonant Frequency (GHz)
	Dr±0.05 (mm)	dr±0.1 (mm)	Lr±0.05 (mm)	Ds±0.05 (mm)	dr±0.1 (mm)	Ls±0.05 (mm)	dr (mm)	Lt (mm)	pitch (mm)	
DRA001□□	20.00	4.0	8.30	12.00	4.0	7.00	4	20	0.7	2.6～ 2.8
DRA002□□	16.00	4.0	6.00	10.00	4.0	6.00	4	15	0.7	3.4～ 3.8
DRA003□□	10.00	3.0	4.20	6.00	3.0	3.50	3	10	0.5	5.2～ 5.6
DRA004□□	5.50	2.0	2.10	3.50	2.0	2.00	2	10	0.4	10.3～11.3

Table 5. Characteristivs codes and electrical specifications

Characteristic Code	Frequency Temperature Coefficient (τf) (ppm/℃)	Dielecrtic Constant (εr)	Q (at 7GHz)
A	−4	36.6±0.5	6000 min
B	−2	37.0±0.5	
C	0	37.4±0.5	
D	2	37.7±0.5	
E	4	38.0±0.5	
F	6	38.3±0.5	
G	8	38.6±0.5	
H	10	38.9±0.5	

Table 6. Special codes

Special Code	Tolerance of the frequency Temperature Coefficient
No code	±2
A	±1
B	±0.5

Frequency characteristic of Q value

$$Q \cong \frac{100,000}{2.0 \times fo + 2.6} \qquad fo : [GHz]$$

Note : When placing orders :

- If the characteristic codes are not specified, D characteristics (2ppm/℃) will be applied.
- If the special codes are not specified, ±2ppm/℃ of the temperature coefficient tolerance of the resonant frequency will be applied

RESOMICS®

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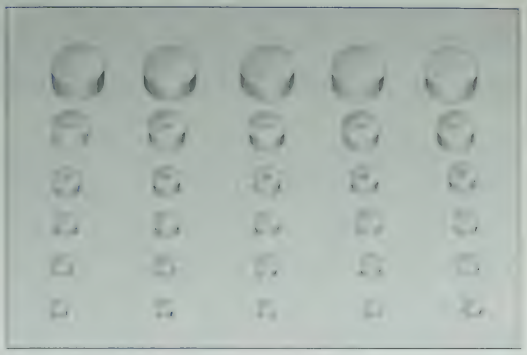
Dielectric Resonator : R Series

FEATURES

1. High Q-value of 15,000 at 10GHz
2. High dielectric constant : $\varepsilon r=30$
3. The resonant frequency temperature coefficient can be chosen from 0 to 6ppm/℃. Tolerance of the frequency temperature coefficient can be chosen ±0.5, ±1 and ±2ppm/℃.
4. Dielectric resonater are chosen from the frequency range of 4.6 to 24.2 GHz in disk type (DRD), and from the frequency range of 5.7 to 13.1 GHz in cylindrical type (DRT).



PART NUMBER

※Please specify the part number when ordering.

(Ex.) DRD 055 R D 024 A
❶ ❷ ❸ ❹ ❺ ❻

❶Configuration : DRD denotes disk type, DRT denotes cylindrical type.

❷Outer diameter : Outer diameter is designated in units of 1/10mm using 3 digits.

❸Material : R designates the kind of material.

❹Characteristic code : The temperature coefficient of resonant frequency. Designated by the codes shown in Table 7.

❺Thickness : Designated in units of 1/10mm using 3 digits.

❻Special code : The temperature coefficient tolerance of resonant frequency. Denoted by the codes shown in Table 8.

Table 7. Characteristic codes and electrical specification of dielectric resonator

Characteristic Code	Frequency Temperature Coefficient (τf) (ppm/℃)	Dielectric Constant (εr)	Q (at 10GHz)
C	0	29.2±0.5	12,000min
D	2	29.9±0.5	
E	4	30.6±0.5	
F	6	31.3±0.5	

● Frequency characteristic of Q value

$$Q \geqq \frac{120,000}{fo}$$ fo : [GHz]

Table 8. Special codes

Special Code	Tolerance of Frequency Temperature Coefficient (ppm/℃)
No Code	±2
A	±1
B	±0.5

RATING (DRD Type)

Part Number	Dr±0.05 (mm)	Lr±0.05 (mm)	Frequency Range (GHz)
DRD026R□012	2.59	1.15	22.1～24.2
DRD028R□013	2.82	1.25	20.4～22.1
DRD031R□014	3.06	1.36	18.9～20.4
DRD033R□015	3.33	1.48	17.5～18.9
DRD036R□016	3.62	1.61	16.2～17.5
DRD039R□018	3.94	1.76	15.0～16.2
DRD043R□019	4.28	1.91	13.5～15.0
DRD046R□021	4.65	2.06	12.6～13.5
DRD051R□022	5.06	2.24	11.6～12.6
DRD055R□024	5.50	2.44	10.8～11.6
DRD060R□027	5.98	2.65	9.7 ～10.8
DRD065R□029	6.50	2.88	9.0 ～ 9.7
DRD071R□031	7.07	3.14	8.3 ～ 9.0
DRD077R□034	7.69	3.41	7.7 ～ 8.3
DRD084R□037	8.36	3.71	6.9 ～ 7.7
DRD091R□040	9.09	4.03	6.4 ～ 6.9
DRD099R□044	9.88	4.38	5.9 ～ 6.4
DRD107R□048	10.75	4.77	5.5 ～ 5.9
DRD117R□052	11.68	5.18	5.0 ～ 5.5
DRD127R□056	12.70	5.63	4.6 ～ 5.0

RATING (DRT Type)

Part Number	Dr±0.05 (mm)	dr±0.1 (mm)	Lr±0.05 (mm)	Frequency Range (GHz)
DRT051R020□022	5.06	2.0	2.24	11.9 ～13.1
DRT055R020□024	5.50	2.0	2.44	11.0 ～11.9
DRT060R020□027	5.98	2.0	2.65	10.0 ～11.0
DRT065R020□029	6.50	2.0	2.88	9.1 ～10.0
DRT071R020□031	7.07	2.0	3.14	8.4 ～ 9.1
DRT077R020□034	7.69	2.0	3.41	7.7 ～ 8.4
DRT084R030□037	8.36	3.0	3.71	7.1 ～ 7.7
DRT091R030□040	9.09	3.0	4.03	6.5 ～ 7.1
DRT099R030□044	9.88	3.0	4.38	6.0 ～ 6.5
DRT105R030□046	10.50	3.0	4.60	5.7 ～ 6.0

Dielectric Resonator with Improved Q on U-series Highly Improved Q Especially for Frequency below 4GHz

FEATURES

1. High Q of 15,000 at 4GHz.
2. High dielectric constant : $\varepsilon r = 38$
3. Resonant frequency temperature coefficient can be chosen from 0 to 6ppm/°C. Tolerance of frequency temperature coefficient can be chosen from ±0.5, ±1, and ±2 ppm/°C.

PART NUMBERING

(※Please specify the part number when ordering.)

(Ex) DRD 055 M D 024 A
❶ ❷ ❸ ❹ ❺ ❻

❶Configuration : DRD denotes disk type, DRT denotes cylindrical type.
❷Outer diameter : Outer diameter is designated in units of 1/10mm using 3 digits.
❸Material : M designates the king of material.
❹Characteristic code : The temperature coefficient of resonant frequency. Designated by the codes shown in Table 9.
❺Thickness : Designated in units of 1/10mm using 3 digits.
❻Special code : The temperature coefficient tolerance of resonant frequency is denoted by the codes shown in Table 10.

RATING (DRD Type)

Part Number	Dr±0.05 (mm)	Lr±0.05 (mm)	Frequency Range (GHz)
DRD046M_021	4.65	2.06	11.46~12.45
DRD051M_022	5.06	2.24	10.54~11.46
DRD055M_024	5.50	2.44	9.69~10.54
DRD060M_027	5.98	2.65	8.91~ 9.69
DRD065M_029	6.50	2.88	8.20~ 8.91
DRD071M_031	7.07	3.14	7.54~ 8.20
DRD077M_034	7.69	3.41	6.93~ 7.54
DRD084M_037	8.36	3.71	6.38~ 6.93
DRD091M_040	9.09	4.03	5.87~ 6.38
DRD099M_044	9.88	4.38	5.40~ 5.87
DRD107M_048	10.75	4.77	4.96~ 5.40
DRD117M_052	11.68	5.18	4.56~ 4.96
DRD127M_056	12.70	5.63	4.20~ 4.56
DRD138M_061	13.81	6.13	3.86~ 4.20
DRD150M_067	15.02	6.66	3.55~ 3.86
DRD163M_072	16.33	7.24	3.27~ 3.55
DRD178M_079	17.76	7.88	3.00~ 3.27
DRD193M_086	19.31	8.56	2.76~ 3.00
DRD210M_093	21.00	9.31	2.54~ 2.76
DRD228M_101	22.83	10.13	2.34~ 2.54
DRD248M_110	24.82	11.01	2.15~ 2.34
DRD270M_120	26.99	11.97	1.98~ 2.15
DRD293M_130	29.35	13.02	1.82~ 1.98
DRD319M_142	31.91	14.15	1.67~ 1.82
DRD347M_154	34.70	15.39	1.54~ 1.67

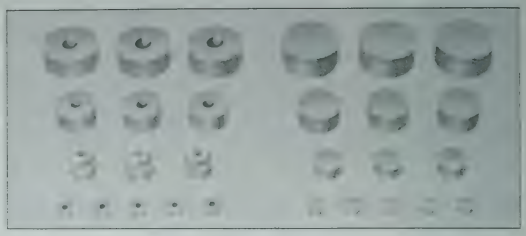


Table. 9. Characteristic codes and electrical specification of dielectric resonator

Characteristic Code	Frequency Temperature Coefficient (τt) (ppm/°C)	Dielectric Constant (εr)	Q (at 7GHz)
C	0	37.4±0.5	7,400min.
D	2	37.7±0.5	7,200min.
E	4	38.0±0.5	7,100min.
F	6	38.3±0.5	7,000min.

● Frequency characteristics of Q value

$$Q \geqq \frac{100,000}{1.95 \times fo + 0.117 \times \tau f - 0.15}$$

fo : [GHz]
τf : [ppm/°C]

Table. 10.Special codes

Special Code	Tolerance of Frequency Temperature Coefficient (ppm/°C)
No code	±2
A	±1

RATING (DRT Type)

Part Number	Dr±0.05 (mm)	dr±0.1 (mm)	Lr±0.05 (mm)	Frequency Range (GHz)
DRT051M020_022	5.06	2.0	2.24	10.45~11.45
DRT055M020_024	5.50	2.0	2.44	9.69~10.45
DRT060M020_027	5.98	2.0	2.65	8.91~ 9.69
DRT065M020_029	6.50	2.0	2.88	8.20~ 8.91
DRT071M020_031	7.07	2.0	3.14	7.54~ 8.20
DRT077M020_034	7.69	2.0	3.41	6.93~ 7.54
DRT084M030_037	8.36	3.0	3.71	6.38~ 6.93
DRT091M030_040	9.09	3.0	4.03	5.87~ 6.38
DRT099M030_044	9.88	3.0	4.38	5.40~ 5.87
DRT107M040_048	10.75	4.0	4.77	4.96~ 5.40
DRT117M040_052	11.68	4.0	5.18	4.56~ 4.96
DRT127M040_056	12.70	4.0	5.63	4.20~ 4.56
DRT138M040_061	13.81	4.0	6.13	3.86~ 4.20
DRT150M040_067	15.02	4.0	6.66	3.55~ 3.86
DRT163M040_072	16.33	4.0	7.24	3.27~ 3.55
DRT178M040_079	17.76	4.0	7.88	3.00~ 3.27
DRT193M040_086	19.31	4.0	8.56	2.76~ 3.00
DRT210M040_093	21.00	4.0	9.31	2.54~ 2.76

RESOMICS®

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Dielectric Resonator E Series

The First Resonator (εr=24.5) with Q of 10,000 at 25GHz.

FEATURES

1. High Q of 24,000 at 10GHz.
2. High dielectric constant : εr=24.5
3. Resonant frequency temperature coefficient can be chosen from 0 to 6ppm/℃. Tolerance of frequency temperature coefficient can be chosen from ±1, ±2 ppm/℃.
4. Dielectric resonater are chosen from the frequency range of 8.4 to 25 GHz in disk type (DRD), and from the frequency range of 8.4 to 19.5 GHz in cylindrical type (DRT).
5. E-series is also fit for application above 25GHz. please consult us.

PART NUMBERING

(※Please specify the part number when ordering.)

(Ex.) DRD 055 E D 024 A
❶ ❷ ❸ ❹ ❺ ❻

❶Configuration : DRD denotes disk type, DRT denotes cylindrical type.
❷Outer diameter : Outer diameter is designated in units of 1/10mm using 3 digits.
❸Material : E designates the kind of material.
❹Characteristic code : The Temperature coefficient of resonant frequency is designated by the codes shown in Table 11.
❺Thickness : Designated in units of 1/10mm using 3 digits.
❻Special code : The temperature coefficient tolerance of resonant frequency is denoted by the codes shown in Table 12.

Table. 11. Characteristic codes and electrical specification of dielectric resonator

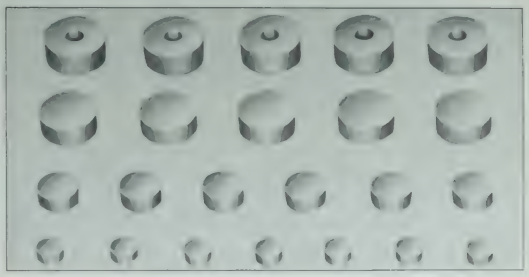
Characteristic Code	Frequency Temperature Coefficient (τf) (ppm/℃)	Dielectric Constant (εr)	Q (at 10GHz)
C	0	24.2±0.4	20.000min
D	2	24.4±0.4	
E	4	24.7±0.4	
F	6	24.9±0.4	

● Frequency characteristic of Q

$$Q \geqq \frac{200,000}{fo} \qquad fo : [Ghz]$$

Table. 12. Special codes

Special Code	Tolerance of Frequency Temperature Coefficient (ppm/℃)
No code	±2
A	±1



RATING (DRD Type)

Part Number	Dr±0.05 (mm)	Lr±0.05 (mm)	Frequency Range (GHz)
DRD028E_013	2.82	1.25	23.17～25.15
DRD031E_014	3.06	1.36	21.27～23.17
DRD033E_015	3.33	1.48	19.48～21.27
DRD036E_016	3.62	1.61	17.93～19.48
DRD039E_018	3.94	1.76	16.47～17.93
DRD043E_019	4.28	1.91	15.16～16.47
DRD046E_021	4.65	2.06	13.95～15.16
DRD051E_022	5.06	2.24	12.82～13.95
DRD055E_024	5.50	2.44	11.80～12.82
DRD060E_027	5.98	2.65	10.85～11.80
DRD065E_029	6.50	2.88	9.98～10.85
DRD071E_031	7.07	3.14	9.18～ 9.98
DRD077E_034	7.69	3.41	8.44～ 9.18

RATING (DRT Type)

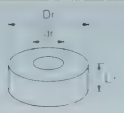
Part Number	Dr±0.05 (mm)	dr±0.1 (mm)	Lr±0.05 (mm)	Frequency Range (GHz)
DRT036E013_016	3.62	1.3	1.61	17.93～19.48
DRT039E013_018	3.94	1.3	1.76	16.47～17.93
DRT043E013_019	4.28	1.3	1.91	15.16～16.47
DRT046E020_021	4.65	2.0	2.06	13.95～15.16
DRT051E020_022	5.06	2.0	2.24	12.82～13.95
DRT055E020_024	5.50	2.0	2.44	11.80～12.82
DRT060E020_027	5.98	2.0	2.65	10.85～11.80
DRT065E020_029	6.50	2.0	2.88	9.98～10.85
DRT071E020_031	7.07	2.0	3.14	9.18～ 9.98
DRT077E020_034	7.69	2.0	3.41	8.44～ 9.18

Support for Resonator (DRZ Type)

■APPLICATION

Supports for RESOMICS ®DRT Type

■RATING

Part Number			
	Outer Diameter ±0.05 (mm)	Inner Diameter ±0.1 (mm)	Thickness ±0.05 (mm)
DRZ001	3.50	2.0	0.60
DRZ002			1.50
DRZ003	6.00	3.0	1.20
DRZ004			2.50
DRZ005	8.00	4.0	2.00
DRZ006			4.00
DRZ007	10.00		3.50
DRZ008			6.00
DRZ009	12.00		4.00
DRZ010			7.00

RESOMICS®

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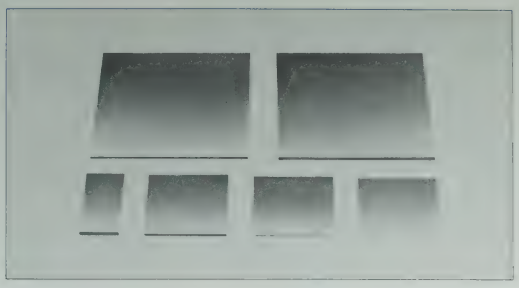
Microwave Dielectric Substrate (DBR Type)

■FEATURES

1. High dielectric constant miniaturizes MIC.
2. Provides very high Q-value throughout the microwave bands.
3. Extremely dense ceramic composition provides smooth surfaces.



■PART NUMBERING

※Please specify the part number when ordering

(Ex.) DBR ❶ 254 ❷ H ❸ 127 ❹ HG ❺ C ❻ 124 ❼

❶Configuration : Denotes rectangle-shaped dielectric substrate.

❷Length : Length is designated in units of 1/10mm using 3 digits.

❸Kinds of Material : Materials are designated by codes shown in Table 13.

❹Thickness : Thickness is designated in units of 1/100mm using 3 digits.

❺Temperature Coefficient : The temperature coefficient of the dielectric constant is denoted by the codes shown in Table 13.

Table 13. Ceramics for Substrate

Mterial Code	Temp. Coeficient Code	Dielectric Constant (εr)	Temp. Coefficient of Dielectric Constant (ppm/℃)	Linear Expansion Coefficient (ppm/℃)
H	HG	38±1	−30±30	6～ 7
P	HG	21.4±1	−30±30	8～ 9
K	HG	91±3	−30±30	8～ 9

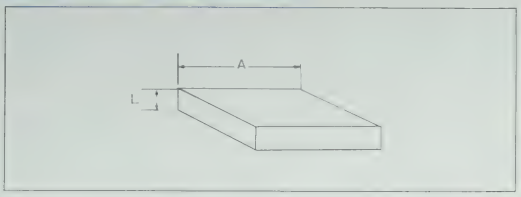
❻Surface treatment : Degree of surface treatment is designated by alphabetical characters shown in Table 14. C denotes the standard degree of surface treatment.

Table 14. Surface Finish Codes

Surface Finish Code	C	D	F
Average Surface Roughness (μm) [Ra]	0.1～0.8	0.05～0.4	0.004～0.04
Reflective Luster (60°GS)	1～6	6～50	150～

❼Width : Width is designated in units of 1/10mm using 3 digits. This item is deleted in case of square substrates.

■EXTERNAL DIMENSIONS



● Table 15. Examples of dielectric substrate part numbers and specifications.

Part Number	Configuration	A ±0.1 (mm)	L ±0.05 (mm)	Dielectric Constant (εr)	Linear Expansion Coefficient	Surface Finish (μm) [Ra]
DBR508H127HGC	Square	50.8	1.27	38±1	6～ 7	0.1～0.8
DBR254H063HGC		25.4	0.63			
DBR508P080HGC		50.8	0.80	21.4±1	8～ 9	
DBR254P040HGC		25.4	0.40			
DBR508K140HGC		50.8	1.40	91±3	8～ 9	
DBR254K070HGC		25.4	0.70			

RESOMICS®

muRata

Microwave Ceramic Components

◈Please confirm the type and rated value upon ordering as they are subject to change for improvement without notice Please contact us for further information

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MURATA WORLD TRADING COMERCIAL LTDA.
[illegible] 7040 Distrito Industrial, Manaus-Am Postal 413 CEP 69075, Brazil
[illegible] 92-615-2112 2114 2145 2160

[illegible] **MURATA ELEKTRONIK GMBH & CO. HANDELS KG.**
[illegible]trasse 21-23,8500 Nurnberg 70 Germany Phone 0911-66870 Telex 623763

[illegible]FRANCE **MURATA ELECTRONIQUE S.A.**
[illegible] Avenue Edouard Herriot 92356 Le Plessis Robinson Cedex France
Phone 1-40941400 Telex 6[illegible]

[illegible]TALY> **MURATA ELETTRONICA S.p.A**
Via Sancarlo, 1 20040 Caponago, Milano Phone 02-95743000 Telex 330385

<ENGLAND> **MURATA ELECTRONICS (UK) Limited**
Oak House Ancells Road, Ancells Business Park, Fleet, Aldershot Hampshire, GU13 8UN U K
Phone 0252-811666 Telex 858971 MEU G

<NETHERLANDS> **MURATA ELECTRONICS (NETHERLANDS) B.V.**
Planetenweg 69-71 2132 HM Hoofddorp, Nn Amsterdam, The Netherlands Phone:2503-21506

<SINGAPORE> **MURATA ELECTRONICS SINGAPORE (PTE.) LTD.**
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<MALAYSIA> **MURATA TRADING (MALAYSIA) Sdn. Bhd.**
Suite 1211, Plaza Pengkalan, Batu 3 Ialan Ipoh, 51100 Kuala Lumpur Malaysia
[illegible]

<TAIWAN> **TAIWAN MURATA ELECTRONICS CO., LTD.**
225 Chung-Ching Road Taichung, Taiwan Phone:042-91-4151 Telex 27571 MURATA

MURATA ERIE N.A., INC. Taiwan Branch
Room 1403, Chia Hsin Building 96 Chung-Shan N Rd., Sec. 2, Taipei 10449, Taiwan
Phone 02-562-4218 Telex 27571 MURATA

<THAILAND> **MURATA ELECTRONICS, LTD.**
Nothern Region Industrial Estate 63 Moo 4 Tambol Ban-Klang Amphoe Muang, Lamphun 51000 Kingdom of Thailand
Phone 053-58[illegible]

<HONG KONG> **MURATA COMPANY, Limited**
Units 1314-22 13F Park-In Commercial Centre 56 Dundas Street Mongkok Kowloon Hong Kong
Phone 3-7822618 Telex 56208 HKMRT HX

<KOREA> **MURATA MFG. CO., LTD.** Seoul Branch
Room 906, Lee Ma Bldg., 146-1, Susong Dong, Chongro-Ku, Seoul Korea
Phone 730-7605, 730-7321 [illegible]

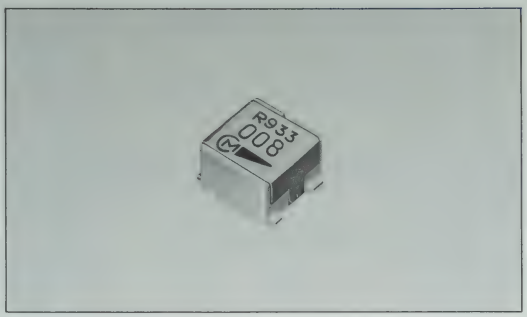
1991. 6. 7K

MICROWAVE ISOLATOR

muRata

Microwave Isolator CE060 Series

Miniature SMD Isolator
Most Suitable For Hand Held Telephone



■FEATURES

1. Surface mount
2. Reflow soldering is available.
3. Miniature size (6.8×6.9×4mm)
4. Light weight (0.8g)
5. High reliability

■APPLICATIONS

1. Hand Held Telephone
2. Cordless Telephone
3. Interstage matching in microwave circuits

■PART NUMBERING

(※Please specify the part number when ordering.)

(Ex.) CE ❶ 060 ❷ R836 ❸ D ❹ C ❺ ❻ 001 ❼ – ❽

❶Series Name
❷Model Number
❸Center Frequency (express in GHz, R : indicate decimalpoint)
❹Band Width Rank
❺Rating Power Rank
❻Signal Direction (Specify A or B in Fig-1)
❼Standard type has no number. (Additional numbers for special specification)
❽Packaging Type TA1 : ϕ178mm taping (250pcs/reel)
TA2 : ϕ330mm taping (1000pcs/reel)
nothing : bulk

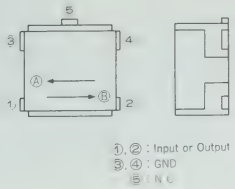
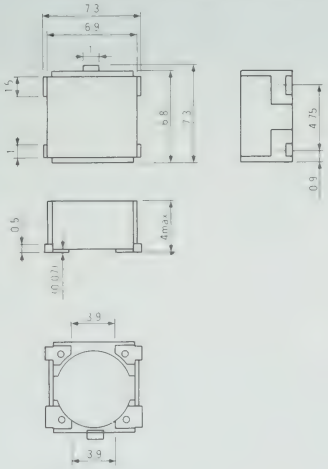


Fig-1 : Terminal Location and Signal Direction (A or B)

■DIMENSIONS



Signal Direction Marking : IN ► OUT (Unit : mm)

■RATING

Part Number	Frequency Range (MHz) ※1	Insertion Loss (dB)	Isolation (dB)	VSWR	Rating Power (W)	Reflection Power (W) ※2
CE060R836DC□	824～849	1.0 max. (−35～+85℃)	12 min. (−35～+85℃)	1.6 max. (−35～+85℃)	2.5	0.5
CE060R888DC□	872～905					
CE060R902DC□	890～915					
CE060R911DC□	898～925					
CE060R933CC□	925～942					

※1 Note : Other frequency range is also available on request.
※2 Note : Case surface temperature should be less than 100 ℃.

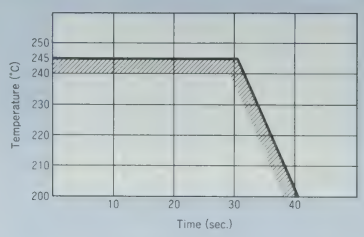
MICROWAVE ISOLATOR

muRata

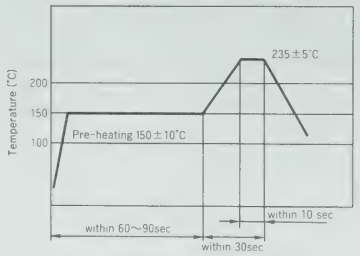
Microwave Isolator CE060 Series

■Soldering Conditions

1. Reflow Soldering
   Soldering must be carried out without exceeding the approved soldering temperature and time shown within the shaded area of the following graph. When soldering is repeated, the allowed time is the accumulated time.
   The standard soldering conditions are the soldering temperature (235℃) and soldering time (less than 10 sec.).



Graph-1 : Allowable temperature and time of reflow soldering



Graph-2 : Reflow soldering standard condition

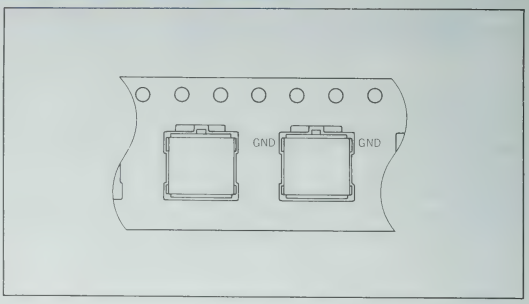
2. Soldering with soldering iron
   When using a soldering iron, the following conditions should be carried out.

❶ Pre-heating (Pre-heating temperature 150℃, Pre-heating time 60 ~ 120 sec.)
❷ Soldering (Temperature at the tip of the soldering iron should be less than 280℃. Soldering time should be less than 10 sec.)

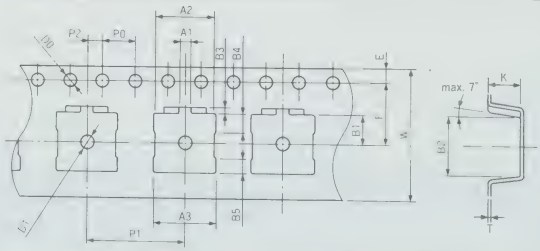
■MOUNTING

When mounting CE060 series isolator by component placement machine, non-magnetic tool should be used. (For example, Pick-up nozzle and Positioning claw, etc.) Because there is some magnetic leakage from isolator.

■DIRECTION OF TERMINAL



■TAPE DIMENSIONS



A1, A2, A3, B1, B2, B3, B4 and B5 are the bottom of dimensions of the cavity.

(Unit : mm)

A1	A2	A3	B1	B2	B3	B4	B5	W	D0	D1	E	F
1.6±0.1	7.2±0.1	7.7±0.1	3.6±0.05	7.2±0.1	0.7±0.1	2.3±0.1	1.8±0.1	16±0.2	ϕ1.55±0.05	1.5以上	1.75±0.1	7.5±0.1

K	P0	P1	P2	T
4±0.1	4±0.1	12±0.1	2±0.1	0.3±0.05

MICROWAVE ISOLATOR

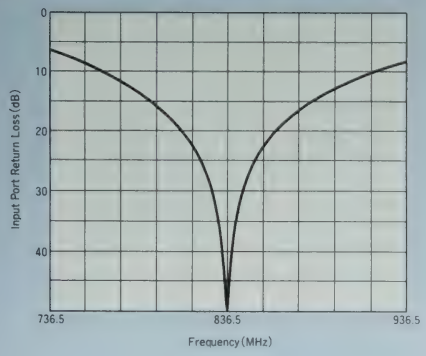
muRata

Microwave Isolator CE152 Series

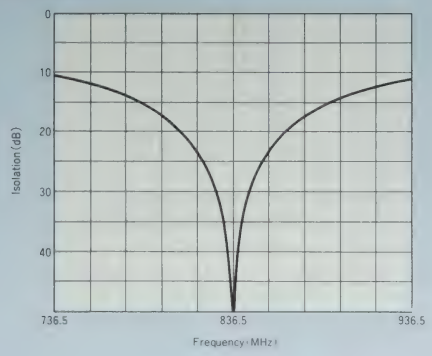
TYPICAL CHARACTERISTICS

Part Number : CE152R836DEB

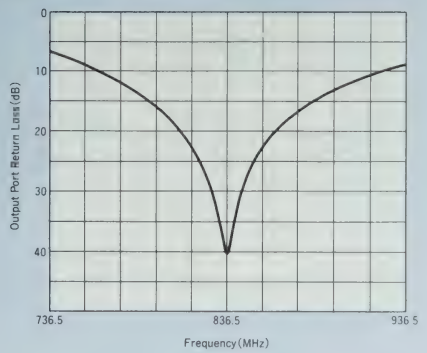
● Input Port Return Loss



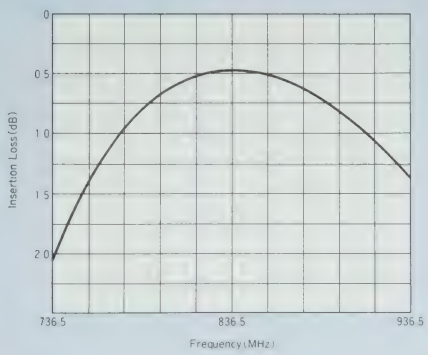
● Isolation



● Output Port Return Loss



● Insertion Loss



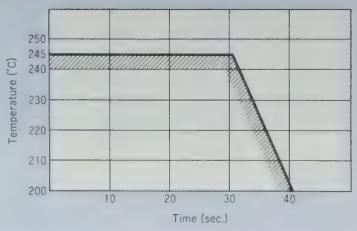
MICROWAVE ISOLATOR

muRata

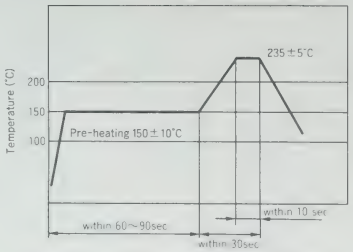
Microwave Isolator CE060 Series

Soldering Conditions

1. Reflow Soldering
   Soldering must be carried out without exceeding the approved soldering temperature and time shown within the shaded area of the following graph. When soldering is repeated, the allowed time is the accumulated time.
   The standard soldering conditions are the soldering temperature (235℃) and soldering time (less than 10 sec.).



Graph-1 : Allowable temperature and time of reflow soldering



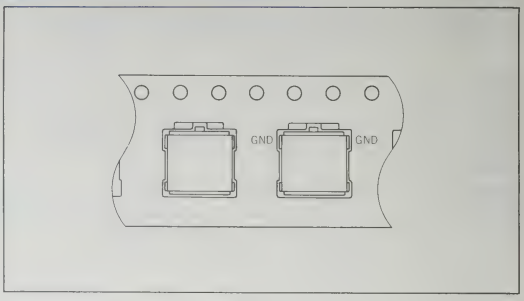
Graph-2 : Reflow soldering standard condition

2. Soldering with soldering iron
   When using a soldering iron, the following conditions should be carried out.
   ❶ Pre-heating (Pre-heating temperature 150℃, Pre-heating time 60 ~ 120 sec.)
   ❷ Soldering (Temperature at the tip of the soldering iron should be less than 280℃. Soldering time should be less than 10 sec.)

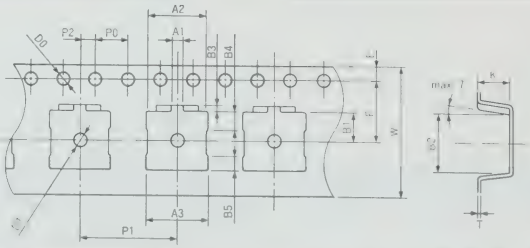
MOUNTING

When mounting CE060 series isolator by component placement machine, non-magnetic tool should be used. (For example, Pick-up nozzle and Positioning claw, etc.) Because there is some magnetic leakage from isolator.

DIRECTION OF TERMINAL



TAPE DIMENSIONS



A1, A2, A3, B1, B2, B3, B4 and B5 are the bottom of dimensions of the cavity.

(Unit : mm)

A1	A2	A3	B1	B2	B3	B4	B5	W	D0	D1	E	F
1.6±0.1	7.2±0.1	7.7±0.1	3.6±0.05	7.2±0.1	0.7±0.1	2.3±0.1	1.8±0.1	16±0.2	ϕ1.55±0.05	1.5以上	1.75±0.1	7.5±0.1

K	P0	P1	P2	T
4±0.1	4±0.1	12±0.1	2±0.1	0.3±0.05

MICROWAVE ISOLATOR

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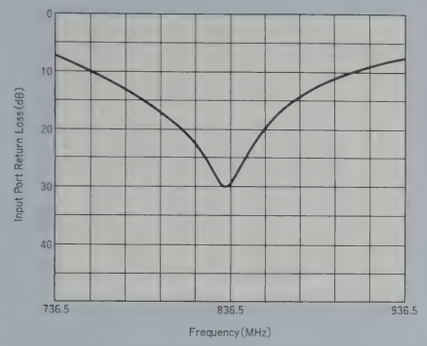
Microwave Isolator **CE060** Series

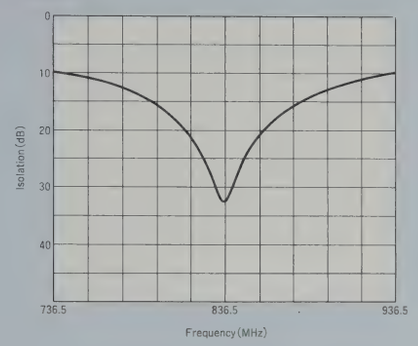
TYPICAL CHARACTERISTICS

Part Number : CE060R836DCB

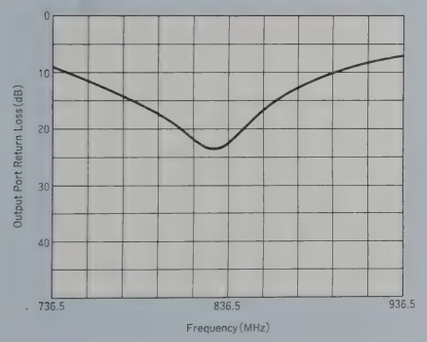
● Input Port Return Loss



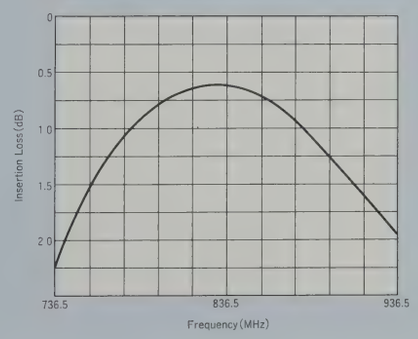
● Isolation



● Output Port Return Loss



● Insertion Loss



MICROWAVE ISOLATOR

muRata

Microwave Isolator **CE152** Series

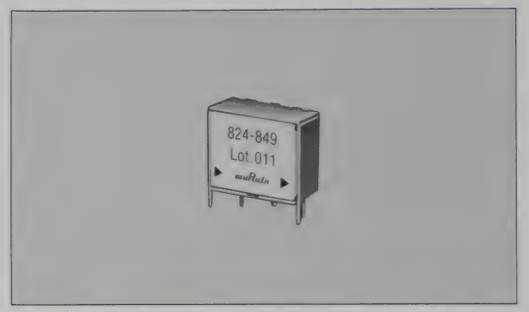
Absorbs Antenna Mismatching and Maintains Stable Transmissions

FEATURES

1. Small size (15×12.3×6.5mm)
2. High reliability

APPLICATIONS

1. Mobile Telephone
2. Cordless Telephone
3. Interstage matching in microwave circuits
4. Power protector for microwave test equipment



PART NUMBERING

(※Please specify the part number when ordering.)

(Ex.) CE ❶ 152 ❷ R836 ❸ D ❹ E ❺ ❻ 001 ❼

❶Series Name
❷Model Number
❸Center Frequency (express in GHz, R : indicate decimalpoint)
❹Band Width Rank
❺Rating Power Rank
❻Signal Direction (Specify A or B in Fig-1)
❼Standard type has no number. (Additional numbers for special specification)

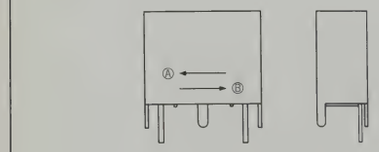
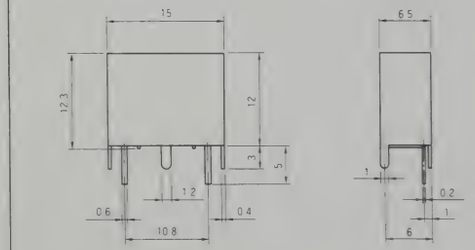


Fig-1 : Terminal Location and Signal Direction (A or B)

DIMENSIONS



Signal Direction Marking : IN ► OUT (Unit : mm)

RATING

Part Number	Frequency Range (MHz) ※1	Band Width (%)	Insertion Loss (dB)	Isolation (dB)	VSWR	Rating Power (W)	Reflection Power (W) ※2
CE152R836DE□	824~849	Full	0.7 max. (−35~+85℃)	13 min. (−35~+85℃)	1.5 max. (−35~+85℃)	10	3
CE152R888DE□	872~905						
CE152R902DE□	890~915						
CE152R911DE□	898~925						
CE152R933CE□	925~942						
CE152R□E□	300~500	4 max.	1.0 max.	13 min.	1.6 max.		
	500~800	3 max.					

※1 Note : Other frequency range is also available on request.
※2 Note : Case surface temperature should be less than 100℃.

11

Insert
Foldout/Map
Here

MONOLITHIC CERAMIC CAPACITOR

muRata

HiQ Chip Type Monolithic Ceramic Capacitor GR700 Series

High Frequency Ceramic Capacitors for the GHz-Range

■ FEATURES

- Miniature sizes
- Stable COG temperature characteristics
- Very high Q at high frequencies
- Impervious to environmental conditions
- Meets MIL-C-55681B equivalently with respect to: Thermal Shock, Moisture Resistance, Solderability, Vibration, Barometric Pressure, Temperature Cycling, Immersion & Salt Spray.

■ PART NUMBERING

(※Please specify the part number when ordering)

(Ex.) GR708 COG 100 D 200 Omitted
❶ ❷ ❸ ❹ ❺ ❻

❶ Type
Initial two or three alphabets indicate shape and the following three digits indicate structure and dimension

❷ Temperature Characteristics
Temperature characteristics are shown below.

Class Ⅰ

Capacitance temperature coefficient

Code	Nominal Value (ppm/°C)
CO	0

Tolerance of capacitance temperature coefficient

Code	Tolerance (ppm/°C)
G	±30

❸ Nominal Capacitance
Nominal capacitance is indicated by three digits. The first two indicate significant figures and the last one indicates the number of zeroes to follow (unit: pF).

❹ Capacitance Tolerance
Shown by an alphabet

Class Ⅰ (COG)

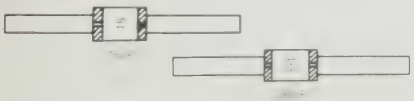
Code	C	D	F	J	K
Cap. Tol.	±0.25pF	±0.5pF	±1pF	±5%	±10%
Applied to	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

❺ Rated Voltage
50VDC, 100VDC and 200VDC.

❻ Other Specifications
Specifications not included in the above.

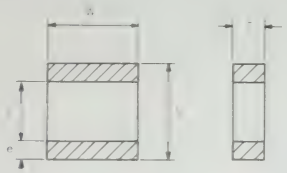
■ MARKING

Markings are omitted from GR706, GR708, GR710, GRH706, GRH708 and GRH710. In case of RPN710 the actual number is marked for less than 100pF and the three digits are marked for over 100pF.

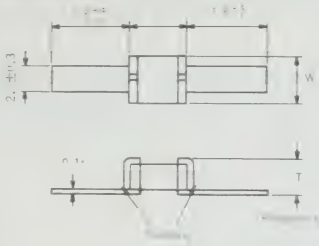


■ DIMENSIONS

Chip Type



Micro Strip Type



Type	Dimensions (mm) L	W	T	e	g
GR706	1.25±0.3	1.0 ±0.3	1.0 max.	0.15min.	0.3min.
GR708	2.0 ±0.3	1.25±0.3	1.25max.	0.2 min.	0.5min.
GR710	3.2 ±0.4	2.5 ±0.3	1.7 max.	0.3 min.	0.5min.
GRH706	1.25±0.3	1.0 ±0.3	1.1 max.	0.15min.	0.3min.
GRH708	2.0 $^{+0.3}_{-0.3}$	1.25 $^{+0.3}_{-0.3}$	1.45max.	0.2 min.	0.5min.
GRH710	3.2 $^{+0.6}_{-0.4}$	2.5 $^{+0.3}_{-0.3}$	1.9 max.	0.3 min.	0.5min.
RPN710	4.0max.	3.0max.	2.3 max.	0.3 min.	0.5min.

GR: chip type GRH: solder coated chip type
RPN: micro strip type

MICROWAVE ISOLATOR

muRata

Microwave Isolator **CE060/CE152** Series

Please confirm the type and rated value upon ordering as they are subject to change for improvement without notice. Please contact us for further information.

muRata MURATA MFG.CO.,LTD.

HEADQUARTERS

INTERNATIONAL DIVISION

MURATA ERIE NORTH AMERICA, INC.

MURATA ERIE NORTH AMERICA LTD.

MURATA ERIE TEXAS, INC.

MURATA ELECTRONICA MEXICANA S.A. de C.V.

MURATA ELETRÔNICA DO BRASIL LTDA.

MURATA AMAZÔNIA INDÚSTRIA E COMÉRCIO LTDA.

MURATA WORLD TRADING COMERCIAL LTDA.

MURATA ELEKTRONIK GMBH & CO. HANDELS KG

MURATA ELECTRONIQUE S.A.

MURATA ELETTRONICA S.p.A.

MURATA ELECTRONICS (UK) Limited

MURATA ELECTRONICS (NETHERLANDS) B.V.

MURATA ELECTRONICS SINGAPORE (PTE.) LTD.

MURATA TRADING (MALAYSIA) Sdn. Bhd.

TAIWAN MURATA ELECTRONICS CO., LTD.

MURATA ERIE N.A., INC.

MURATA ELECTRONICS LTD.

MURATA COMPANY Limited

MURATA MFG. CO., LTD.

1991. 6. TK

MONOLITHIC CERAMIC CAPACITOR

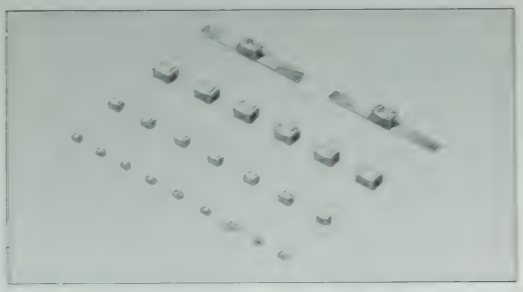
muRata

HiQ Chip Type Monolithic Ceramic Capacitor GR700 Series

High Frequency Ceramic Capacitors for the GHz-Range

■ FEATURES

- Miniature sizes
- Stable COG temperature characteristics
- Very high Q at high frequencies
- Impervious to environmental conditions
- Meets MIL-C-55681B equivalently with respect to: Thermal Shock, Moisture Resistance, Solderability, Vibration, Barometric Pressure, Temperature Cycling, Immersion & Salt Spray.



■ PART NUMBERING

(※Please specify the part number when ordering)

(Ex.)	GR708	COG	100	D	200	Omitted
	❶	❷	❸	❹	❺	❻

❶ **Type**

Initial two or three alphabets indicate shape and the following three digits indicate structure and dimension.

❷ **Temperature Characteristics**

Temperature characteristics are shown below.

Class Ⅰ

Capacitance temperature coefficient

Code	Nominal Value ppm/°C
CO	0

Tolerance of capacitance temperature coefficient

Code	Tolerance ppm/°C
G	±30

❸ **Nominal Capacitance**

Nominal capacitance is indicated by three digits. The first two indicate significant figures and the last one indicates the number of zeroes to follow (unit: pF).

❹ **Capacitance Tolerance**

Shown by an alphabet.

Class Ⅰ (COG)

Code	C	D	F	J	K
Cap. Tol.	±0.25pF	±0.5pF	±1pF	±5%	±10%
Applied to					

❺ **Rated Voltage**

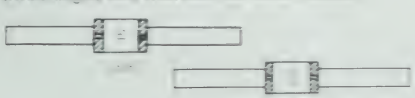
50VDC, 100VDC and 200VDC

❻ **Other Specifications**

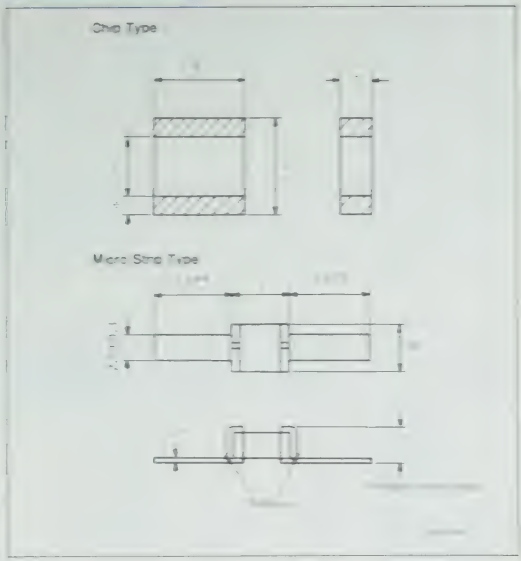
Specifications not included in the above.

■ MARKING

Markings are omitted from GR706, GR708, GR710, GRH706, GRH708 and GRH710. In case of RPN710, the actual number is marked for less than 100pF and the three digits are marked for over 100pF.



■ DIMENSIONS



Dimensions mm					
Type	L	W	T	e	g
GR706	1.25±0.3	1.0 ±0.3	1.0 max.	0.25min	0.3min
GR708	2.0 ±0.3	1.25±0.3	1.25max.	0.2 min	0.5min
GR710	3.2 ±0.4	2.5 ±0.3	1.7 max.	0.3 min	0.5min
GRH706	1.25 [illegible]	1.0 [illegible]	1.0 max.	0.25min	0.3min
GRH708	2.0 [illegible]	1.25 [illegible]	1.45max.	0.2 min	0.5min
GRH710	3.2 [illegible]	2.5 [illegible]	1.9 max.	0.3 min	0.5min
RPN710	4.0max.	3.0max.	2.3 max.	0.3 min	0.5min

GR: chip type GRH: solder hooked chip type
RPN: micro strip type

■ RATING

● 200V COG

Cap (pF) \ Type	GR706 GRH706	GR708 GRH708	GR710 GRH710 RPN710
0.5	C・D	C・D	C・D
0.6	C・D	C・D	C・D
0.7	C・D	C・D	C・D
0.8	C・D	C・D	C・D
0.9	C・D	C・D	C・D
1.0	C・D	C・D	C・D
1.1	C・D	C・D	C・D
1.2	C・D	C・D	C・D
1.3	C・D	C・D	C・D
1.4	C・D	C・D	C・D
1.5	C・D	C・D	C・D
1.6	C・D	C・D	C・D
1.7	C・D	C・D	C・D
1.8	C・D	C・D	C・D
1.9	C・D	C・D	C・D
2.0	C・D	C・D	C・D
2.1	C・D	C・D	C・D
2.2	C・D	C・D	C・D
2.4	C・D	C・D	C・D
2.7	C・D	C・D	C・D
3.0	C・D	C・D	C・D
3.3	C・D	C・D	C・D
3.6	C・D	C・D	C・D
3.9	C・D	C・D	C・D
4.3	C・D	C・D	C・D
4.7	C・D	C・D	C・D
5.1	C・D・F	C・D・F	C・D・F
5.6	C・D・F	C・D・F	C・D・F
6.2	C・D・F	C・D・F	C・D・F
6.8	C・D・F	C・D・F	C・D・F
7.5	C・D・F	C・D・F	C・D・F
8.2	C・D・F	C・D・F	C・D・F
9.1	C・D・F	C・D・F	C・D・F
10	C・D・F	C・D・F	C・D・F
11	J	J	J
12	J・K	J・K	J・K
	J		
13		J	J
15		J・K	J・K
16		J	J
18		J・K	J・K
20		J	J
22		J・K	J・K
24		J	J
27		J・K	J・K
30		J	J
33		J・K	J・K
36		J	J
39		J・K	J・K
43		J	J
47		J・K	J・K
51		J	J
56			J・K
62			J
68			J・K
75			J
82			J・K
91			J
100			J・K
110			J
120			J・K
130			J
150			J・K
160			J

● 100V COG

Cap. (pF) \ Type	GR706 GRH706	GR708 GRH708	GR710 GRH710 RPN710
15	J・K		
16	J		
18	J・K		
20	J		
22	J・K		
24			
27			
30			
33			
36			
39			
43			
47			
51			
56		J・K	
62		J	
68		J・K	
75		J	
82		J・K	
91		J	
100			
110			
120			
130			
150			
160			
180			J・K
200			J
220			J・K
240			J
270			J・K
300			J
330			J・K
360			J
390			J・K
430			J
470			J・K
510			J

● 50V COG

Cap (pF) \ Type	GR706 GRH706	GR708 GRH708	GR710 GRH710 RPN710
24			
27	J・K		
30	J		
33	J・K		
36	J		
39	J・K		
43	J		
47	J・K		
51	J		
56			
62			
68			
75			
82			
91			
100			
110			
120			
130			
150			
160			
180		J・K	
200		J	
220		J・K	
240		J	
270		J・K	
300		J	
330		J・K	
360		J	
390		J・K	
430		J	
470		J・K	
510		J	
560			J・K
620			J
680			J・K
750			J
820			J・K
910			J
1000			J・K

■ SPECIFICATIONS

1. Type

See the previous page.

2. Temperature Characteristics

Class Ⅰ (COG)

(a) Capacitance tolerance change rate

When ambient temperature changes from stage 1 to 5 in sequence, capacitance value measured with the capacitance of stage 3 as a reference is within the specified tolerance.

Stage	Temperature (℃)
1	25±2
2	−55±3
3	25±2
4	125±3
5	25±2

	Capacitance Tolerance Change Rate from Capacitance at 25℃ (%)					
	−55℃		−30℃		−10℃	
	Max.	Min.	Max.	Min.	Max.	Min.
COG	0.58	−0.24	0.40	−0.17	0.25	−0.11

(b) Temperature coefficient

Temperature coefficient is within the specified tolerance at a temperature range of +25℃ to +125℃.

(c) Capacitance deviation

The differences between the maximum and minimum values measured in the stages 1, 3 and 5 in the table of 2·(1)·(a) are divided by the medium value (or the differences between the medium and minimum value), then the values obtained satisfy the following table.

	Standards
Capacitance Deviation	Within ±0.2% or ±0.05pF (Whichever is larger)

3. Nominal Capacitance

See the previous page.

4. Capacitance Tolerance

Capacitance tolerance is within the specified value when it is measured under the following frequency and voltance at 25℃.

Item \ Char.	COG
Frequency	1±0.1 MHz
Voltage	0.5 to 5 Vrms

5. Rated Voltage

Item \ Char.	COG
Rated Volt	50VDC、100VDC、200VDC

6. Other Specifications

(1) Operating Temperature range : −55 to +125℃

(2) Dielectric strength

No marked defect when 300% DC voltage of the rated voltage is applied between the electrodes for one to five seconds.

Charging and discharging currents shall be less than 50mA.

(3) Insulation resistance

Insulation resistance satisfies the following values when measured at DC voltage not exceeding the rated voltage through 1MΩ protective resistance within two minutes of charging.

Item \ Char.	COG
Insulation Resistance	at 25℃ : 0.5 to 470pF···10^6MΩ min. over 470pF·····10^5MΩ min. at 125℃ : 0.5 to 470pF···10^5MΩ min. over 470pF·····10^4MΩ min.

(4) Q

Q satisfy the following values when measured under the same conditions as the capacitance.

Char \ Item	Q	
COG	C≦220pF	Q≧10,000
	220pF<C≦ 470pF	Q≧ 5,000
	470pF<C≦1000pF	Q≧ 3,000

C : Nominal capacitance value (pF)

(5) Adhesion of external electrode

- Chip type

Solder a capacitor to test jig (alumina substrate) shown in Fig. 1 with an eutectic solder. Soldering should be done either by hand iron or in furnace so carefully as to make a uniformed finish and to avoid anything irregular such as thermal shock. No peeling or other troubles of external electrode when 1kg※"force" is imposed to the capacitor in the direction shown in Fig. 2.

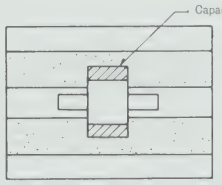


Fig. 1

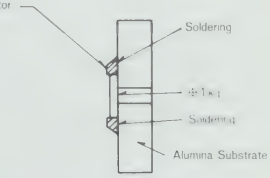


Fig. 2

※ GR706 / GRH706 : 0.5kg

• Micro strip type

(a) Tensile strength

The capacitor shall not be damaged when its main body is fixed and a load is applied in the axial direction of each terminal slowly up to 0.5kg.

(b) Bending strength of lead wire terminal

Hold the main body of capacitor so that lead wire terminal directs perpendicularly, and load 0.25kg to it. Then bend the main body by 90 degrees, revert it, bend it again by 90 degrees in reversed direction this time and return it to the original state. Lead wire terminals never cut or break when the above procedures are slowly performed.

(6) Vibration resistance

The capacitor is securely soldered to a supporting terminal and vibration which is 10 to 55Hz in the vibration frequency range, 1.5mm in total amplitude, and about 1 minute in the rate of vibration change from 10Hz to 55Hz and back to 10Hz is applied for a total of 6 hours; 2 hours each in three mutually perpendicular directions. The measured values satisfy the values in the following table.

Item \ Char.	COG
Appearance	No marked defect
Cap.	Within specified tolerance
Q or DF	Satisfies the initial values

(7) Solder heat resistance

(a) Chip type

After preheating GR706 and GR708 types for two minutes and the other types for five minutes from 80°C to 100°C to 150°C to 200°C, immerse them for 3±0.5 seconds in 3% silver containing solder of 270±5°C. Cool them slowly (under ambient temperature) and leave them at room temperature for 24±2 hours. Satisfies the following table.

Item	COG
Appearance	No marked defect
Capacitance Change	Within ±2.5% or ±0.25pF (Whichever is greater)
Dielectric Strength	No defects

(b) Micro strip type

The lead wire is immersed in a melted solder (JIS-H-4341, H63A) at 270±10°C for 3±0.5 seconds until it reaches about 2mm inside the root of capacitor main body. The following values are obtained when measured within 24±2 hours after the above operation.

Item \ Char	COG
Appearance	No marked defect
Capacitance	±2.5% or ±0.25pF (Whichever is greater)
Dielectric Strength (between terminals)	No defects

(8) Solderability

(a) Chip type

Immerse the capacitor first in methanol (JIS-K-1501) solution of rosin (JIS-K-5902) (rosin 25wt%) then in melted solder at 230±5°C for 5±0.5 seconds. 75% of external electrode portion is to be soldered evenly and continuously.

(b) Micro strip type

The terminal of a capacitor is dipped into a 25% methanol (JIS-K-1501) solution of rosin (JIS-K-5902) and then immersed in a molted solder (JIS-H-4341, H63A) of 230±5°C for 5±0.5 seconds until it reaches depth of dipping is up to about 1mm from the root of terminal. This process makes complete soldering of the dipped part of area at more than 75% solder-coverage. Other 25% is not on one side only.

(9) Temperature cycle

Heat treat the capacitor for one hour at 150^{+0}_{-10}°C, leave it at room temperature for 48±4 hours, and make initial measurement. Then attach capacitor to test jig with method and conditions identical to (6) and perform five cycles at temperatures and time shown in the following table. The capacitor satisfies the following values after being left at room temperature for 24±2

Levels	1	2	3	4
Temp. (°C)	-55^{+0}_{-3}	room temp.	$+125^{+3}_{-0}$	room temp.
Time(minute)	30±3	3max.	30±3	3max.

Item \ Char.	COG
Appearance	No marked defect
Capacitance Change	within ±5% or ±0.5pF (Whichever is larger)
Q or DF	C≧30pF : Q≧350 10pF≦C<30pF : Q≧275+$\frac{5}{2}$C C<10pF : Q≧200+10C
Insulation Resistance	1000MΩ min.
Dielectric Strength (between terminals)	No defect

C : Nominal capacitance value (pF)

(10) Humidity

Test cycles of temperature −10 to +65°C and humidity 80 to 98% for 24 hours are applied ten times. The capacitor satisfies the following values when it is left at room temperature within 24±2 hours.

Item \ Char.	COG
Appearance	No marked defect
Capacitance Change	within ±5% or ±0.5pF (Whichever is greater)
Q or DF	C≧30pF : Q≧350
	10pF≦C<30pF : Q≧275+$\frac{5}{2}$C
	C<10pF : Q≧200+10C
Insulation Resistance	1000MΩ min.
Dielectric Strength (between terminals)	No defect

C : Nominal capacitance value (pF)

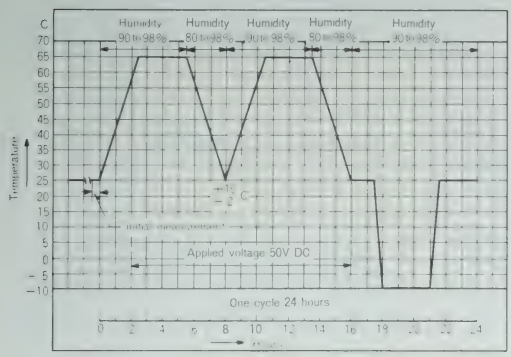


Fig. 3

(11) High temperature resistance (load test)

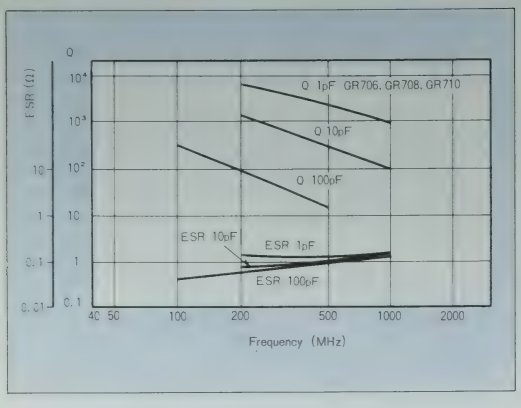
Apply 200% of the rated DC voltage, for one hour at maximum operating temperature ±3°C to the capacitor, and make initial measurement. Apply the same voltage at the same temperature for 1,000±12 hours continuously. The capacitor satisfies the following values when measured after being left at room temperature for 24±2 hours. Charging and discharging currents for measurement shall be 50mA and below.

Item \ Char.	COG
Appearance	NO marked defect
Capacitance Change	within ±3.0% or ±0.3pF (Whichever is larger)
Q or DF	C≧30pF : Q≧350
	10pF≦C<30pF : Q≧275+$\frac{5}{2}$C
	C<10pF : Q≧200+10C
Insulation Resistance	1000MΩ min.
Dielectric Strength (between terminals)	No defect

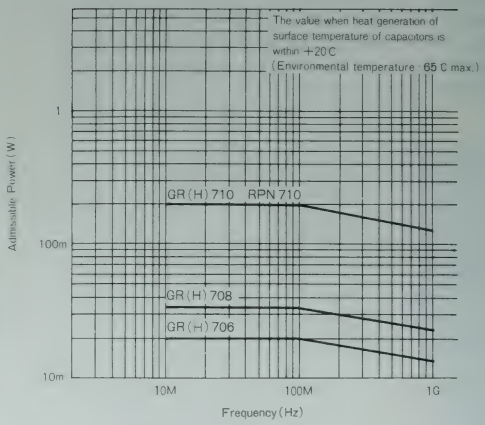
C : Nominal capacitance value (pF)

■ TYPICAL PERFORMANCE DATA

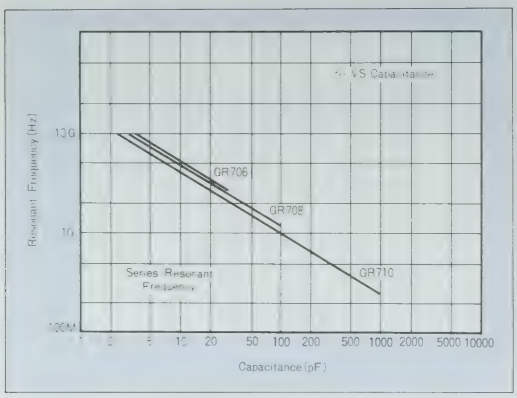
Q, ESR · Frequency



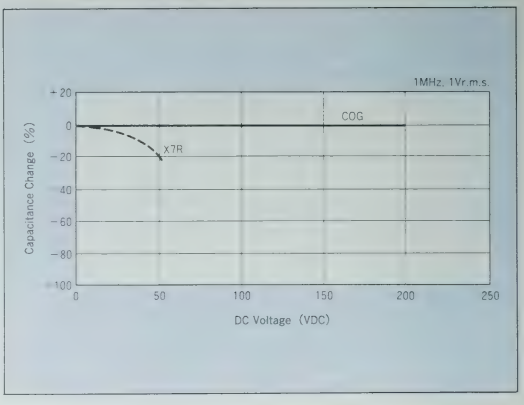
Admissible Power-Frequency Characteristic



Series Resonant Frequency vs. Capacitance Value



DC Voltage Bias Characteristics.



■ APPLICATION OF HiQ CHIP TYPE MONOLITHIC CERAMIC CAPACITORS

Materials

Flux : : Rosin flux
Eutectic solder containing 2—5% silver

Application

1. Chip type : GR706, GRH706, GR708, GRH708, GR710, GRH710

Soldering with Iron

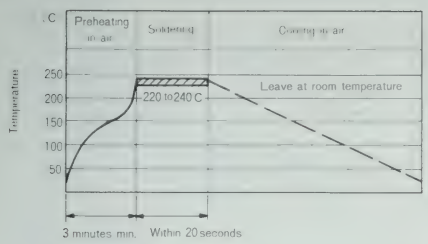
Preheating is unnecessary for sizes smaller than 2.0×1.25mm under the following conditions.

Watts : Within 30 watts
Soldering tip diameter : 3 mm max.
Soldering time : Within 20 sec.

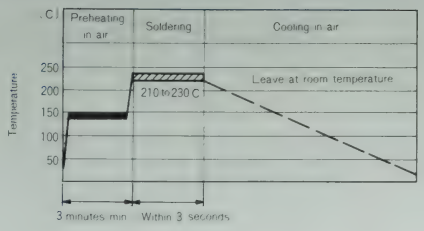
Though the tip of the soldering iron may contact terminal electrodes, be sure it does not come into contact with the ceramic element itself.

Preheating the capacitor so that the temperature difference between the capacitor and soldering tip is less than 150°C is necessary if the capacitor is 3.2×2.5 mm or larger.

Reflow Soldering



Dip Soldering



The entire element should be immersed in the solder solution and removed quickly to prevent localized heating of the ceramic element.

Capacitor damage could occur if only a part of the ceramic element is immersed in the solder solution.

After immersion, the capacitor should be cooled naturally in room temperature, air forced cooling is not recommended.

Preheating should be done within the recommended time.

Furthermore, there should be no problems within the rated time so long as the ceramic base is at the rated temperature.

2. Micro strip type (RPN710)

a. Solder in the position of 1 mm away from the ribbon terminal base, being careful that the solder tip does not directly contact the capacitor.
   Preheating is unnecessary.
b. Complete soldering within 3 seconds with a soldering tip less than 270°C.

MONOLITHIC CERAMIC CAPACITOR

muRata

HiQ Chip Type Monolithic Ceramic Capacitors GR700 Series

※Please confirm the type and rated value upon ordering as they are subject to change for improvement without notice. Please contact us for further information

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MONOLITHIC CERAMIC CAPACITOR

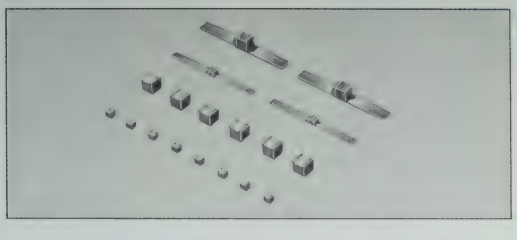
muRata

HiQ and High Power Chip Type Monolithic Ceramic Capacitors GR110 Series

Porcelain Ceramic Capacitors for Microwave up to 10 GHz

■ FEATURES

- Miniature size
- Stable COG temperature characteristics
- Very high Q at high frequencies
- High RF power capabilities
- High self-resonant frequencies
- Impervious to environmental conditions
- Meets MIL-C-55681B equivalently with respect to: Thermal Shock, Vibration, Moisture Resistance, Solderability, Barometric pressure, Temperature Cycling, Immersion & Salt spray.



■ PART NUMBERING

(※Please specify the part number when ordering.)

(Ex.) RPN111 (❶) COG (❷) 511 (❸) K (❹) 100 (❺) Omitted (❻)

❶ Type
Initial two or three alphabets indicate shape and the following three digits indicate structure and dimension.

❷ Temperature Characteristics
Temperature characteristics are shown below

Class Ⅰ

Capacitance temperature coefficient

Code	Nominal Value (ppm/℃)
CO	0

Tolerance of capacitance temperature coefficient

Code	Tolerance (ppm/℃)
G	±30

❸ Nominal Capacitance
Nominal capacitance is indicated by three digits. The first two indicate significant figures and the last one indicates the number of zeroes to follow (unit: pF).

❹ Capacitance Tolerance
Shown by an alphabet.

Class Ⅰ

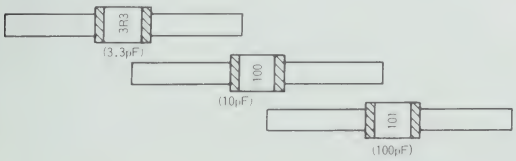
Code	C	D	F	J	K
Cap. Tol.	±0.25pF	±0.5pF	±1pF	±5%	±10%
Applied to	C≦10pF			C>10pF	

❺ Rated Voltage
50VDC, 100VDC, 200VDC, 300VDC and 500VDC

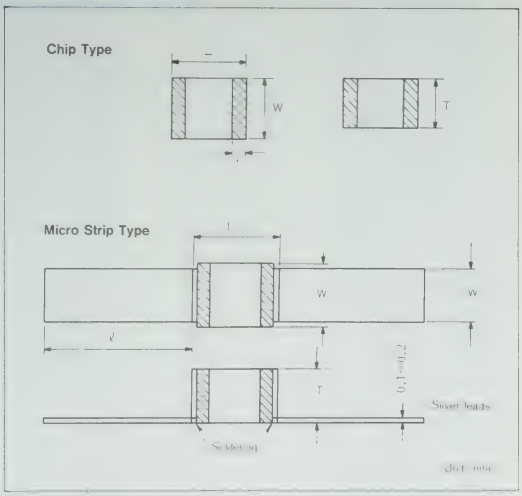
❻ Other Specifications
Specifications not included in the above.

■ MARKING

Markings are omitted from GR110, GR111, GRH110, GRH111 and RPN110.
The three digits are marked for RPN111.



■ DIMENSIONS



Type \ Dimensions	L	W	T	e
GR110	1.4±0.4	1.4±0.4	0.8 to 1.45	0.25±0.15
GRH110	$1.4^{+0.6}_{-0.4}$	$1.4^{+0.6}_{-0.4}$	0.8 to 1.65	$0.25^{+0.25}_{-0.15}$
GR111	2.8±0.4	2.8±0.4	2.0 to 2.6	0.4±0.3
GRH111	$2.8^{+0.6}_{-0.4}$	$2.8^{+0.6}_{-0.4}$	2.0 to 2.8	$0.4^{+0.4}_{-0.3}$

GR : Chip type GRH : Solder coated chip type

Type \ Dimensions	L	W	T	ℓ	w
RPN110	1.6±0.4	1.4±0.4	1.6max.	5.0±2.0	1.3 ±0.4
RPN111	3.2±0.4	2.8±0.4	3.0max.	9.0±2.0	2.35±0.15

■ RATING

● 50V

Cap. (pF) \ Type	GR110 GRH110 RPN110
0.5	C・D
0.6	C・D
0.7	C・D
0.8	C・D
0.9	C・D
1.0	C・D
1.1	C・D
1.2	C・D
1.3	C・D
1.4	C・D
1.5	C・D
1.6	C・D
1.7	C・D
1.8	C・D
1.9	C・D
2.0	C・D
2.1	C・D
2.2	C・D
2.4	C・D
2.7	C・D
3.0	C・D
3.3	C・D
3.6	C・D
3.9	C・D
4.3	C・D
4.7	C・D
5.1	C・D・F
5.6	C・D・F
6.2	C・D・F
6.8	C・D・F
7.5	C・D・F
8.2	C・D・F
9.1	C・D・F
10	C・D・F
11	J・K
12	J・K
13	J・K
15	J・K
16	J・K
18	J・K
20	J・K
22	J・K
24	J・K
27	J・K
30	J・K
33	J・K
36	J・K
39	J・K
43	J・K
47	J・K
51	J・K
56	J・K
62	J・K
68	J・K
75	J・K
82	J・K
91	J・K
100	J・K

● 500V

Cap. (pF) \ Type	GR111 GRH111 RPN111
0.5	C・D
0.6	C・D
0.7	C・D
0.8	C・D
0.9	C・D
1.0	C・D
1.1	C・D
1.2	C・D
1.3	C・D
1.4	C・D
1.5	C・D
1.6	C・D
1.7	C・D
1.8	C・D
1.9	C・D
2.0	C・D
2.1	C・D
2.2	C・D
2.4	C・D
2.7	C・D
3.0	C・D
3.3	C・D
3.6	C・D
3.9	C・D
4.3	C・D
4.7	C・D
5.1	C・D・F
5.6	C・D・F
6.2	C・D・F
6.8	C・D・F
7.5	C・D・F
8.2	C・D・F
9.1	C・D・F
10	C・D・F
11	J・K
12	J・K
13	J・K
15	J・K
16	J・K
18	J・K
20	J・K
22	J・K
24	J・K
27	J・K
30	J・K
33	J・K
36	J・K
39	J・K
43	J・K
47	J・K
51	J・K
56	J・K
62	J・K
68	J・K
75	J・K
82	J・K
91	J・K
100	J・K

● 300V

Cap. (pF) \ Type	GR111 GRH111 RPN111
110	J・K
120	J・K
130	J・K
150	J・K
160	J・K
180	J・K
200	J・K

● 200V

Cap. (pF) \ Type	GR111 GRH111 RPN111
220	J・K
240	J・K
270	J・K
300	J・K
330	J・K
360	J・K
390	J・K
430	J・K
470	J・K

● 100V

Cap. (pF) \ Type	GR111 GRH111 RPN111
510	J・K
560	J・K
620	J・K
680	J・K

● 50V

Cap. (pF) \ Type	GR111 GRH111 RPN111
750	J・K
820	J・K
910	J・K
1000	J・K

■ SPECIFICATIONS

1. Type

See the previous page.

2. Temperature Characteristics

(1) Capacitance tolerance change rate

When ambient temperature changes from stage 1 to 5 in sequence, capacitance value measured with the capacitance of stage 3 as a reference is within the specified tolerance.

Stage	1	2	3	4	5
Temp. (℃)	25± 2	−55±3	25±2	125±3	25±2

	Capacitance Tolerance Change Rate from Capacitance at 25℃ (%)					
	−55℃		−30℃		−10℃	
	Max.	Min.	Max.	Min.	Max.	Min.
COG	0.58	−0.24	0.40	−0.17	0.25	−0.11

(2) Temperature coefficient

When ambient temperature changes from stage 1 to 5 in sequence, capacitance value measured with the capacitance of stage 3 as a reference is within the specified tolerance at +25℃ to +125℃.

(3) Capacitance deviation

The differences between the maximum and minimum values measured in the stages 1, 3 and 5 in the table of 2.(1) are divided by the medium value (or the maximum capacitance differences), then the values obtained satisfy the following table.

	Standards
Capacitance Deviation	Within ±0.2% or ±0.05pF (Whichever is larger)

3. Nominal Capacitance

See the previous page.

4. Capacitance Tolerance

Capacitance tolerance is within the specified value when it is measured under the following frequency and voltage at 25℃.

Item	Specifications
Frequency	1±0.1MHz
Voltage	0.5~5Vrms

5. Rated Voltage

50VDC, 100VDC, 200VDC, 300VDC and 500VDC.

6. Other Specifications

(1) Operating temperature range

−55℃ to +125℃

(2) Q

Q satisfies the following values when measured under the same conditions as the capacitance.

Capacitance	Q
C≦220pF	Q≧10,000
220pF<C≦470pF	Q≧ 5,000
470pF<C≦1000pF	Q≧ 3,000

C : Nominal capacitance value (pF)

(3) Insulation resistance

Insulation resistance satisfies the following values when measured at DC voltage not exceeding the rated voltage through 1MΩ protective resistance within two minutes of charging at 25℃ and 125℃

Capacitance \ Temp.	25℃	125℃
C≦470pF	1,000,000MΩ min.	100,000MΩ min.
470pF<C≦1000pF	100,000MΩ min.	10,000MΩ min.

C : Nominal capacitance value (pF)

(4) Dielectric strength

No marked defect when 250% of the rated voltage is applied between the electrodes for one to five seconds. Charging and discharging currents shall be less than 50mA.

(5) Vibration resistance

Solder the chip type capacitor on the testing jigs (alumina substrate) shown in Figs. 1 and 2 by a solder containing 3% Ag or furnace it so that the uniformity is kept and there are no abnormalities such as heat shock.

The lead type capacitor is firmly soldered to the supporting terminal.

With vibration frequency of 10 to 55Hz and full amplitude of 1.5mm , vibration resistance satisfies the following table after vibrations, which take one minute to develop from 10Hz to 55Hz and return to 55Hz, are given for six hours, two hours each for three mutually perpendicular directions.

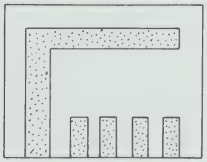


Fig. 1

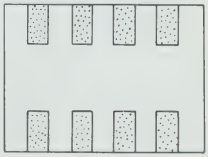


Fig. 2

Appearance	No marked defect
Capacitance Change	Within specified tolerance
Q	Satisfies the specified initial value

(6) Solder heat resistance

(a) Chip type

After preheating GR110 type for two minutes and GR111 type for five minutes from 80°Cto100°C to 150°C to 200°C, immerse them for 3±0.5 seconds in 3% silver containing solder of 270±5°C. Cool them slowly (under ambient temperature) and leave them at room temperature for 24±2 hours. Satisfies the following table.

Item	Specifications
Appearance	No remarkable defect
Capacitance Change	Within ±2.5% or ±0.25pF (Whichever is greater)
Dielectric Strength	No defects

(b) Micro strip type

The lead wire is immersed in a melted solder (JIS-H-4341, H63A) at 270±10°C for 3±0.5 seconds until it reaches about 2mm from the root of capacitor main body. The following values are obtained when measured within 24±2 hours after the above operation.

Item	Specifications
Appearance	No remarkable defect
Capacitance Change	Within ±2.5% or ±0.25pF (Whichever is greater)
Dielectric Strength	No defects

(7) Humidity

Test cycles of temperature −10 to +65°C and humidity 80 to 98% for 24 hours are applied ten times. The capacitor satisfies the following values when it is left at room temperature within 24±2 hours after the final cycle.

Item	Specifications	
Appearance	No marked defect	
Capacitance Change	Within ± 5 % or ±0.5pF (Whichever is larger)	
Q	C≦220pF	Q≧10000
	220pF＜C≦470pF	Q≧ 5000
	470pF≦C＜1000pF	Q≧ 3000
Insulation Resistance	More than 30% of the initial specification value at 25°C	
Dielectric Strength	No defect	

C : Nominal capacitance value (pF)

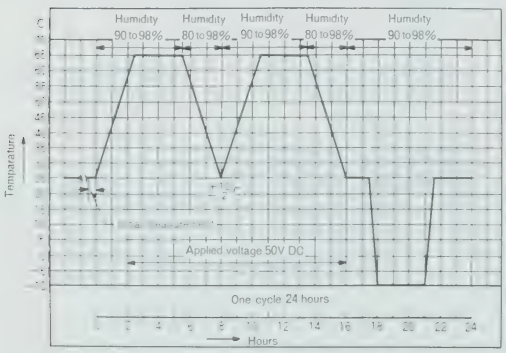


Fig 3

(8) High temperature resistance (load test)

Apply 150% of the rated DC voltage to the capacitor for 2000±12 hours at 125 $^{+4}_{0}$ °C. The capacitor satisfies the following values when measured after being left at room temperature for 24±2 hours. Charging and discharging currents for measurement shall be 50mA and below.

Item	Specifications	
Appearance	No remarkable defect	
Capacitance Change	Within ±2.5% or ±0.25pF (whichever is larger)	
Q	C≦220pF	Q≧10000
	220pF＜C≦470pF	Q≧ 5000
	470pF＜C≦1000pF	Q≧ 3000
Insulation Resistance	More than 30% of the initial specification value at 25°C and 125°C	
Dielectric Strength	No defects	

C : Nominal capacitance value (pF)

(9) Adhesion of external electrode

- Chip type

Solder a capacitor to test jig (alumina substrate) shown in Fig. 4 with 3% silver containing solder. Soldering should be done either by hand iron or in furnace so carefully as to make a uniformed finish and to avoid anything irregular such as thermal shock. No peeling or other troubles of external electrode when 1kg "force" is imposed to the capacitor in the direction shown in Fig. 5.

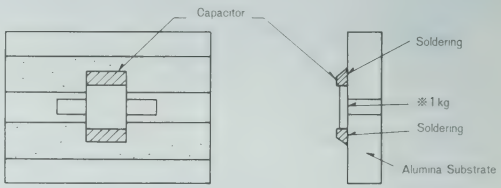


Fig. 4 Fig. 5

- Micro strip type

(a) Tensile strength

The capacitor shall not be damaged when its main body is fixed and a load is applied in the axial direction of each terminal slowly up to 1.0kg. (0.5kg for RPN110)

(b) Bending strength of lead wire terminal

Hold the main body of capacitor so that lead wire terminal directs perpendicularly, and load 0.5kg (0.25kg for RPN110) to it. Then bend the main body by 90 degrees, revert it, bend it again by 90 degrees in reversed direction this time and return it to the original state. Lead wire terminals never cut or break when the above procedures are slowly performed.

(10) Solderability

(a) Chip type

Immerse the capacitor first in methanol (JIS-K-1501) solution of rosin (JIS-K-5902) (rosin 25wt%) then in melted solder at 230±5°C for 5±0.5 seconds. 95% of external electrode portion is to be soldered evenly and continuously.

(b) Micro strip type

The terminal of a capacitor is dipped into a 25% methanol (JIS-K-1501) solution of rosin (JIS-K-5902) and then immersed in a molted solder (JIS-H-4341, H63A) of 230±5°C for 5±0.5 seconds until it reaches about 1mm from the root of terminal. This process makes complete soldering of the dipped part of area at more than 95% solder-coverage. Other 5% is not on one side only.

(11) Temperature cycle and immersion cycle

Repeat five times on the capacitor the cycle starting from −55°C (30±3minutes) → normal temperature (10 to 15 minutes) → +125°C (30±3 minutes) → normal temperature (3 minutes max.), and repeat twice the cycle of immersing it into pure water at 65 $^{+5}_{-0}$ °C for 15 minutes and into saline saturated solution at 0±3°C for 15 minutes. Wash the capacitor immediately with running water and wipe it out with dry cloth.

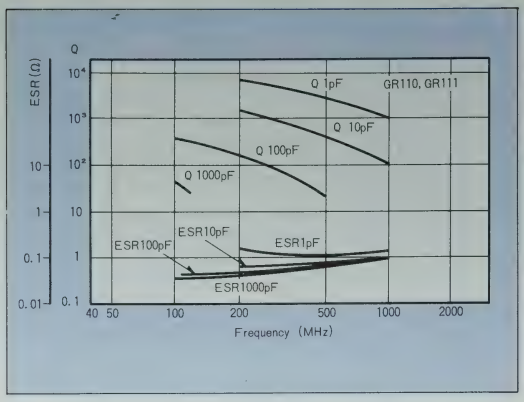
The capacitor satisfies the following table when measured after being left at room temperature for 24±2 hours.

Item	Specifications	
Appearance	No remarkable defect	
Capacitance Change	Within ±1 % or ±0.25% (Whichever is larger)	
Q	C≦220pF	Q≧10000
	220pF<C≦470pF	Q≧ 5000
	470pF<C≦1000pF	Q≧ 3000
Insulation Resistance	More than 30% of the initial specification value at 25°C only.	
Dielectric Strength	No defects	

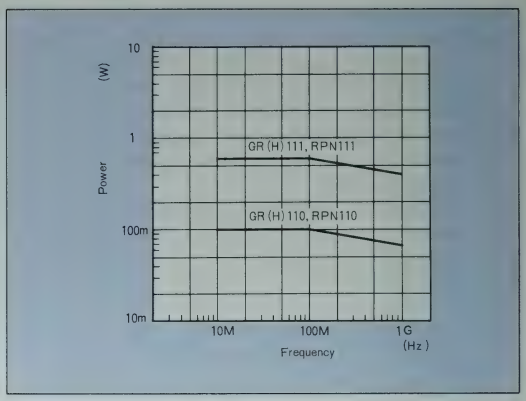
C: Nominal capacitance value (pF)

■ TYPICAL PERFORMANCE DATA

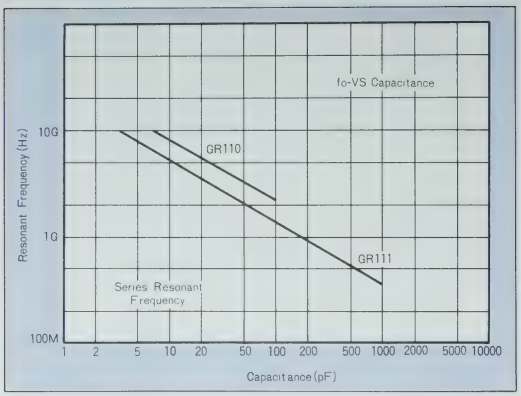
Q, ESR · Frequency



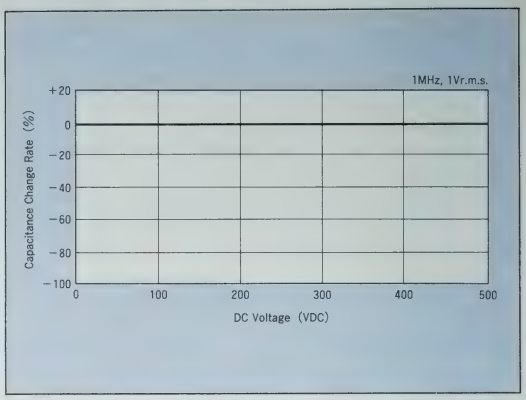
Power Capability



Series Resonant Frequency vs. Capacitance Value



DC Voltage Bias Characteristics



Materials

Flux: : Resin flux
Eutectic solder containing 2—5% silver

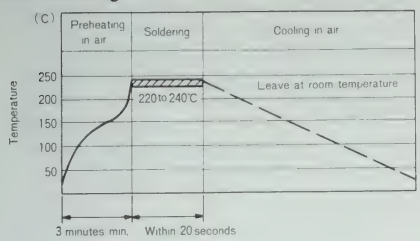
Application

1. Chip type : GR110, GRH110, GR111, GRH111

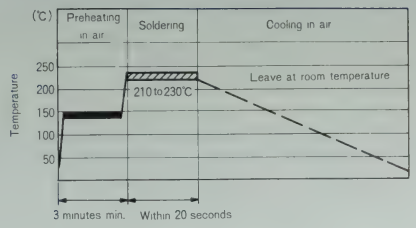
Soldering with Iron

Preheating is unnecessary for sizes smaller than 1.4×1.4 mm under the following conditions.
Watts: Within 30 watts
Soldering tip diameter : 3 mm max.
Tip temperature : 280°C max.
Soldering time: Within 20 sec.
Though the tip of the soldering iron may contact terminal electrodes, be sure it does not come into contact with the ceramic element itself.
Preheating the capacitor so that the temperature difference between the capacitor and soldering tip is less than 150°C is necessary if the capacitor is 2.8×2.8 mm or larger.

Reflow Soldering



Dip Soldering



The entire element should be immersed in the solder solution and removed quickly to prevent localized heating of the ceramic element.
Capacitor damage could occur if only a part of the ceramic element is immersed in the solder solution.
After immersion, the capacitor should be cooled naturally in room temperature, air forced cooling is not recommended.
Preheating should be done within the recommended time.
Furthermore, there should be no problems within the rated time so long as the ceramic base is at the rated temperature.

2. Micro strip type (RPN110/RPN111)

a. Solder in the position of 1 mm away from the ribbon terminal base, being careful that the solder tip does not directly contact the capacitor.
   Preheating is unnecessary.
b. Complete soldering within 3 seconds with a soldering tip less than 270°C.

MONOLITHIC CERAMIC CAPACITOR

muRata

HiQ and High Power Chip Type Monolithic Ceramic Capacitor GR110 Series

Please confirm the type and rated value upon ordering as they are subject to change for improvement without notice. Please contact us for further information.

muRata MURATA MFG. CO.,LTD.

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MURATA ERIE NORTH AMERICA, LTD.

MURATA ERIE TEXAS, INC.

MURATA ELECTRONICA MEXICANA S.A. de C.V.

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HONG KONG MURATA COMPANY Limited

KOREA MURATA MFG. CO., LTD.

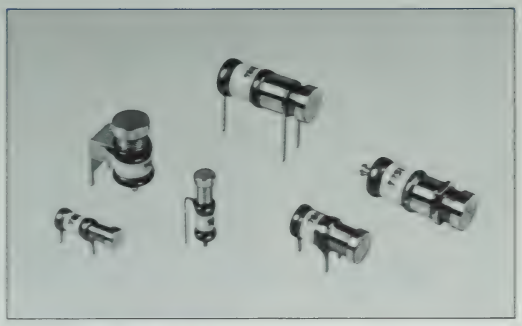
1991. 6. 6K

AIR VARIABLE CAPACITOR

muRata

Precision, Miniature Air Variable Capacitor TTA Series

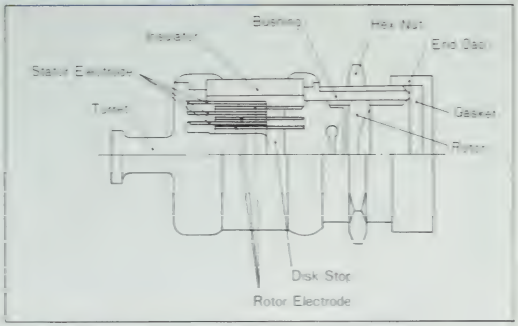
Murata's miniature air variable capacitors are designed for high frequency applications up to 2 GHz.
They are very stable, have good resolution and display excellent characteristics when subjected to environmental extremes. These components have the highest Q of any type air dielectric variable capacitor. The capacitors meet or exceed the requirements of MIL-C-14409. Major applications include VHF, UHF, microwave, military communications, navigation, fire control, space and commercial R.F. devices.



■ FEATURES

1. A positive stop beyond maximum rated capacitance prevents electrical shorting.
2. Engineered to resist heat-won't come apart during soldering.
3. Internal air meshing shells are silver plated to provide the best surface conductivity and long life.
4. A high density ceramic insulator with excellent properties is used between the stator and mounting bushing. This construction contributes to the overall structural strength.
5. The unit is sealed against humidity and contamination by the use of a threaded end cap with a rubber gasket.
6. Solder used in assembly has a melting point of 300°C ±5°C.
7. All leads are gold plated for optimum high frequency conductivity.

■ CONSTRUCTION



■ ORDERING INFORMATION

If MIL requirements must be met, order MIL P/N ; if not, order by Murata P/N.

■ PART NUMBERING

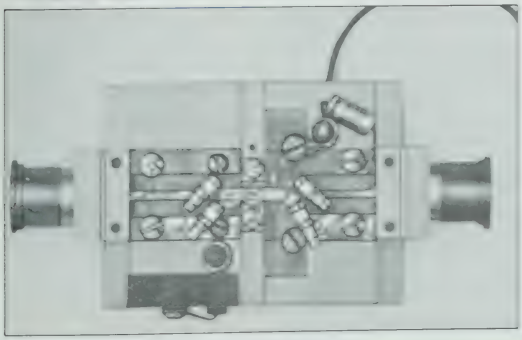
(※ Please specify the part number when ordering.)

(Ex.) TTA 4 2 A 060
❶ ❷ ❸ ❹ ❺

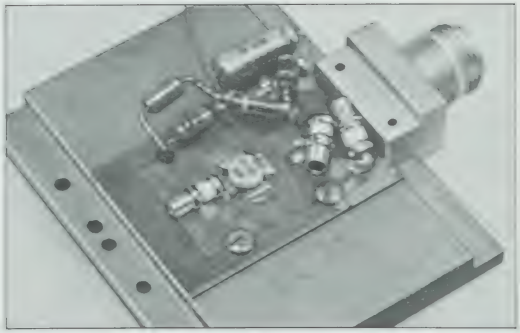
❶ Series
❷ Style
❸ Size
❹ Characteristic
❺ Capacitance

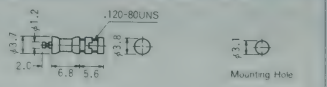
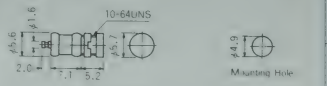
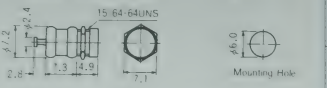
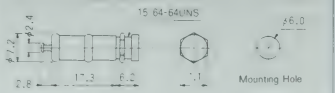
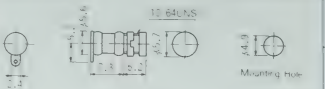
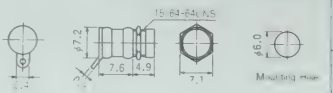
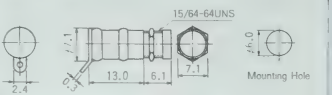
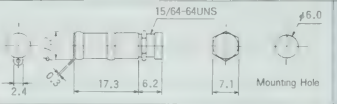
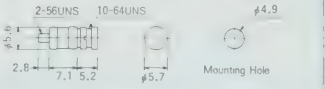
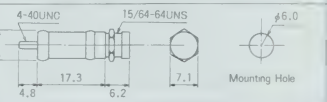
■ APPLICATION

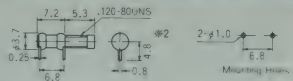
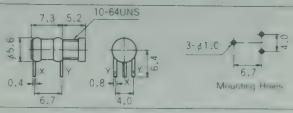
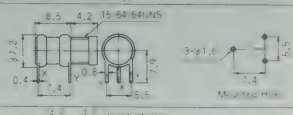
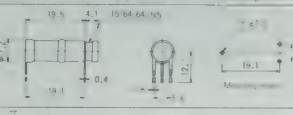
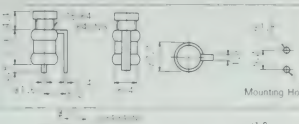
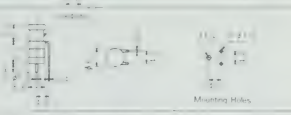
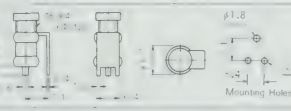
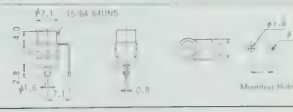
10W2GHz AMP.



Oscillator



Type	Figure	Dimensions (mm)	Part Number		Capacitance Range (pF)	Temp. Coeff. (ppm/℃)	Q Factor at 100MHz
			MURATA P/N	MIL P/N※1			
Panel Mount Type			**TTA21A3R5A**	PC29J3R5	.35— 3.5	0±15	10,000
			**TTA22A060A**	PC31J060	.4 — 6.0	0±15	10,000
			TTA22A100A	PC29J100	.8 —10.0	0±20	7,500
			**TTA23A100A**	PC31J100	.8 —10.0	0±15	5,000
			TTA23A140A	PC31J140	1.0 —14.0	0±25	3,000
			TTA25A200A	PC31J200	1.0 —20.0	0±25	1,200
			**TTA25A300A**	———	1.0 —30.0	0±50	750
			**TTA72A060A**	PC25J060	.6 — 6.0	0±15	10,000
			TTA72A100A	———	.8 —10.0	0±20	7,500
			**TTA73A100A**	PC25J100	.8 —10.0	0±15	5,000
			TTA73A140A	PC25J140	1.0 —14.0	0±25	3,000
			**TTA75A200A**	PC25J200	1.0 —20.0	0±25	1,200
			**TTA75A300A**	———	1.0 —30.0	0±50	750
			TTA81A3R5A	———	.35— 3.5	0±15	10,000
			**TTA82A060A**	———	.4 — 6.0	0±15	10,000
			TTA82A100A	———	.8 —10.0	0±20	7,500
			TTA83A100A	———	.8 —10.0	0±15	5,000
			TTA83A140A	———	1.0 —14.0	0±25	3,000
			TTA85A200A	———	1.0 —20.0	0±25	1,200
			**TTA85A300A**	———	1.0 —30.0	0±50	750

Type	Figure	Dimensions (mm)	Part Number		Capacitance Range (pF)	Temp. Coeff. (ppm/℃)	Q Factor at 100MHz
			MURATA P/N	MIL P/N※1			
Printed Circuit Type			**TTA41A3R5A**	PC28J3R5	.35— 3.5	0±15	10,000
			**TTA42A060A**	——	.4 — 6.0	0±15	10,000
			TTA42A100A	——	.8 —10.0	0±20	7,500
			**TTA43A100A**	PC26J100	.8 —10.0	0±15	5,000
			TTA43A140A	——	1.0 —14.0	0±25	3,000
			TTA45A200A	——	1.0 —20.0	0±25	1,200
			**TTA45A300A**	——	1.0 —30.0	0±50	750
Vertical Mount Type			**TTA51A3R5A**	PC30J3R5	.5 — 3.5	0±15	10,000
			TTA52A060A	——	.6 — 6.0	0±15	10,000
			TTA52A100A	——	1.0 —10.0	0±20	7,500
			**TTA53A100A**	——	1.0 —10.0	0±20	5,000
			TTA53A140A	PC32T140	1.5 —14.0	0±25	3,000
			TTA55A200A	——	1.2 —20.0	0±25	1,200
			**TTA32A100A**	——	1.0 —10.0	0±20	7,500
			**TTA33A100A**	——	1.0 —10.0	0±20	5,000
			TTA33A140A	——	1.0 —14.0	0±25	3,000
			TTA53-1A100A	——	1.0 —10.0	0±20	5,000
			TTA53-1A140A	——	1.5 —14.0	0±25	3,000
			**TTA53-2A100A**	——	1.0 —10.0	0±20	5,000
			TTA53-2A140A	——	1.5 —14.0	0±25	3,000

※1. MIL-C-14409 qualified.
※2. For type PC28J3R5 dimension shall be 5.6mm.

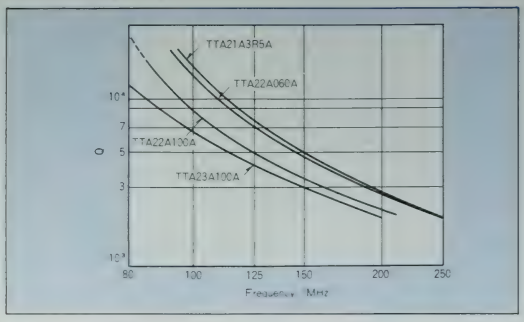
AIR VARIABLE CAPACITOR

muRata

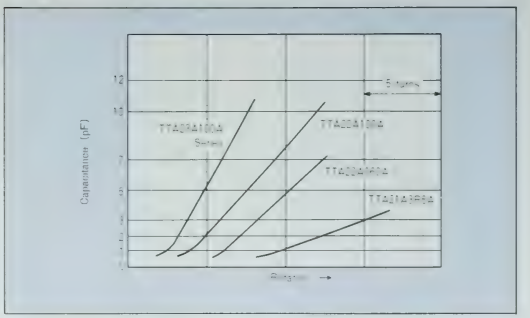
Precision, Miniature Air Variable Capacitor TTA Series

■ PERFORMANCE DATA

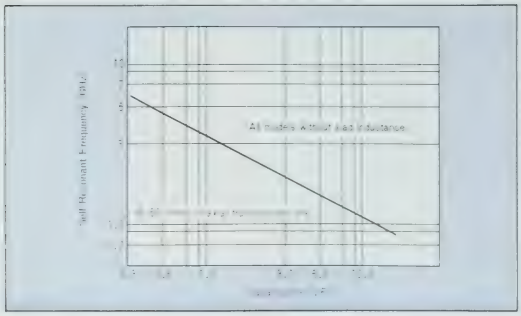
● Q Vs. Frequency



● Capacitance Vs. Rotation



● Self-Resonant Frequency Vs. Capacitance



■ GENERAL SPECIFICATIONS

Working Voltage	250 VDC
Withstand Voltage	500 VDC
Insulation Resistance	>10^6 MΩ at 250 VDC
Torque	0.3 to 3.0 in. oz. for TTA□1A3R5A Series 0.4 to 4.0 in. oz. for TTA□2A060A and TTA□2A100A Series 0.5 to 6.0 in. oz. for TTA□3A100A, TTA□3A140A, TTA□5A200A and TTA□5A300A Series.
Operating Temp. Range	−65℃ to +125℃

■ RECOMMENDED HANDLING PROCEDURE

1. **Soldering**·····Use a 40 watt soldering iron with a maximum tip temperature of 270°C. Dwell time should not exceed 5 sec.
2. **Washing** ·····End caps must be secure if components are to be immersed in solvent or water. If end caps are not used, clean with a brush or absorbent pad.
3. **Caution**·····Do not remove rotor from the unit. Do not force rotor to turn when the mechanical maximum capacitance stop is reached.

※Please confirm the type and rated value upon ordering as they are subject to change for improvement without notice. Please contact us for further information.

muRata MURATA MFG.CO.,LTD.

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INTERNATIONAL DIVISION
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Phone:404-436-1300 Telex:542329
MURATA ERIE NORTH AMERICA, LTD. Canadian Operations
51 Plaisir Avenue Trenton, Ontario, Canada K8V 5S1
Phone:613-392-2581 Telex:682279

〈MEXICO〉 **MURATA ERIE TEXAS, INC.**
27 Concord Street, El Paso, TX 79906 U.S.A. Phone:915-778-0217
MURATA ELECTRONICA MEXICANA S.A. de C.V
Santos Dumont #6620 Parque Industrial Panamericano CD.
Juarez, Chihuahua 32000 Mexico Phone:161-190809

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MURATA AMAZÔNIA INDÚSTRIA E COMÉRCIO LTDA. (MAB)
AL. SANTOS, 1.893-6 andar-Conjunto 62, CEP 01419 São Paulo, SP, Brazil
Phone:011-289-7751, 011-287-4232 Telex:38-1130156 MREB BR

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Holbeinstrasse 21-23 8500 Nurnberg 70, West Germany Phone:0911-66870 Telex:623763

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Le Plessis Robinson Cedex France Phone:1-40941400 Telex:631530

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Via Sancarlo, 1 20040 Caponago, Milano Phone:02-95743000 Telex:330385

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Oak House, Ancells Road, Ancells Business Park, Fleet, Aldershot Hampshire, GU13 8UN U.K
Phone:0252-811666 Telex:858971 MEU G

〈SINGAPORE〉 **MURATA ELECTRONICS SINGAPORE (PTE.) LTD.**
41 Jalan Pemimpin, Off Upper Thomson Road, Singapore 2057
Phone:2584233, Telex:21127

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MURATA ERIE N.A., INC. Taiwan Branch
Room 1403, Chia Hsin Building 96, Chung-Shan N. Rd., Sec. 2, Taipei 10449, Taiwan
Phone:02-562-4218 Telex:27571 MURATA

〈THAILAND〉 **MURATA ELECTRONICS, LTD. (MTL)**
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〈HONG KONG〉 **MURATA COMPANY, Limited**
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〈KOREA〉 **MURATA MFG. CO., LTD.** Seoul Branch
Room 906, Lee Ma Bldg., 146-1, Susong Dong, Chongro-Ku, Seoul, Korea
Phone:730-7605/730-7321 Telex:25858

1990. 9. 2K

COAXIAL CONNECTOR

muRata

Ultra-Miniature Coaxial Connector BFA Type

Suitable for the Small Sized Equipment!
Ultra-miniature Coaxial Connector for High Frequency

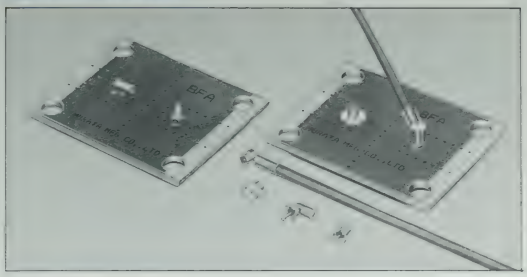
FEATURES

1. Ultra-miniature and low profile
2. Low leakage
3. High performance
4. Low price
5. Available cable assembly
6. Available for ultra-thin coaxial cables

APPLICATIONS

Portable telephones, mobile telephones, cordless telephones, osilloscope, GPS, other R. F. circuits for microwave equipment.

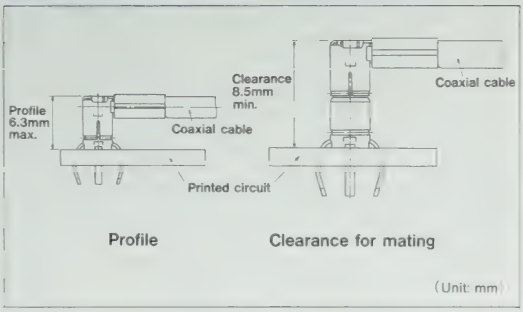
APPEARANCE



PART NUMBER

PART NUMBER	FORMATION AND USE	CONTACT
MM3325-2505	Straight receptacle use on printed circuit board	Male
MM3325-2507	Straight receptacle with insulation spacer use on printed circuit board	Male
MM3326-2506	Right angle receptacle use on printed circuit board	Male
MXYH□□□□□□□□	Right angle cable assembly with flexible cable	Female

DEMENSIONS OF MATING STATE



PART NUMBERING FOR CABLE ASSEMBLY

(※ Please specify the part number when ordering.)

MX	YH	62	XX	200	0
❶	❷	❸	❹	❺	❻

❶ Cable assembly

❷❹ Connector code

Number	Connector
YH	BFA Type Plug Connector
XX	None

❸ Cable number

Number	Cable	Outer Diameter	Outer Conductor	Minimum Bending Radius
62	0.8D-QEW	2.5 mm	Double sealed	10 mm
63	0.8D-QEV	2.0 mm	Single sealed	8 mm

(※) Baced on Japanese Industrial standard.

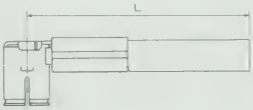
❺❻ Full length of cable assembly

Length L (mm) = ❺ × $10^{❻}$

Ex. 100mm = 100 × 10^0 → 1000

500mm = 500 × 10^0 → 5000

1000mm = 100 × 10^1 → 1001



• FULL LENGTH TOLERANCE

Full length (mm)		Dimensional tolerance (mm)
Over	Max.	
50	100	± 3
100	500	± 4
500	1000	±10
1000	——	Total length $^{+2}_{0}$%

COAXIAL CONNECTOR

muRata

Ultra-Miniature Coaxial Connector BFA Type

RATING AND CHARACTERISTICS

Item	Rating and Characteristics
Voltage Rating	250V r. m. s.
Frequency Rating	DC～4GHz
	DC～2GHz (MM3326-2506)
Nominal Impedance	50Ω
Temperature Range	−40℃～+90℃
Insulation Resistance	1000MΩ Min.
Contact Resistance	10mΩ Max.
Withstanding Voltage	AC300V r. m. s.
V. S. W. R.	1.2 Max.

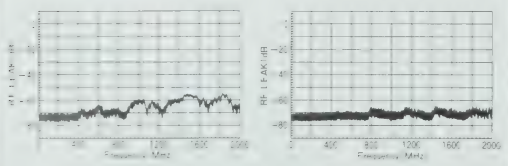
MATERIALS AND FINISH

Part Name	Materials	Finish
Center Contact	Beryllium copper or Brass	Gold plated
Outer Contact	Phosper bronze	Silver plated or Nickel plated
Insulator	Poly-phenylene sulfide or Poly-butylen terephthalate	None
Outer Sleeve	Brass	Zinc plated

DATA OF VOLTAGE STANDING WAVE RATIO

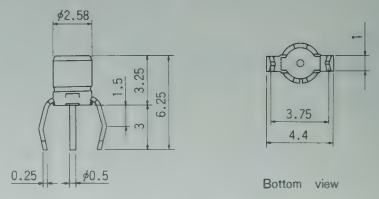
MM3325-2505+MXYH□□□□□□□□

DATA OF R. F. LEAKAGE (Reference)



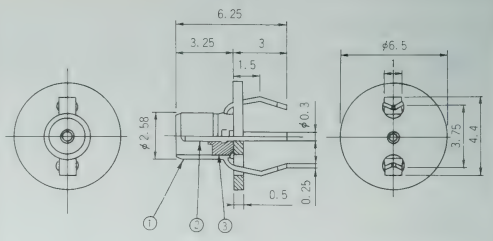
MM3325-2505+MXYH□□□□□□□□

DIMENSIONS (MM3325-2505)



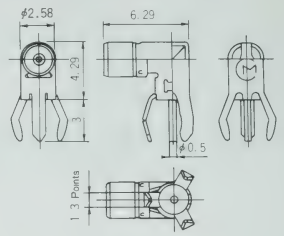
(Unit : mm)

DIMENSIONS (MM3325-2507)



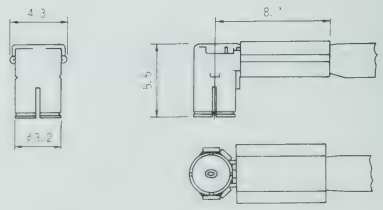
(Unit : mm)

DIMENSIONS (MM3326-2506)



(Unit : mm)

DIMENSIONS (MXYH□□□□□□□□)



(Unit : mm)

COAXIAL CONNECTOR

muRata

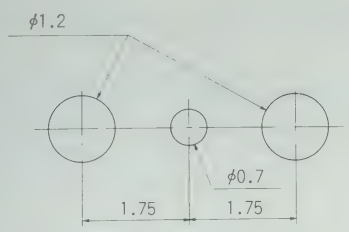
Ultra-Miniature Coaxial Connector BFA Type

COUTIONS FOR USE

1. Dimensions for installation
   Dimensions shown in Fig. should be used when designing P. C. B.
2. Various strength at mating state
   Strength less than shown in Fig. is required.
3. Disengagement
   Use tool P/N M16000 or M16001. The connector to be disengaged should be pulled in the direction of engagement. Do not pull on the cable.
4. This connector should be inserted in vertical.
5. This connector and cable should not be twisted.

RECOMMENDED MOUNTING DIMENSION

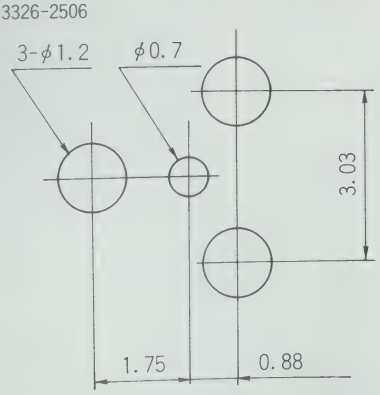
MM3325-2505, MM3325-2507



(Unit : mm)

RECOMMENDED MOUNTING DIMENSION

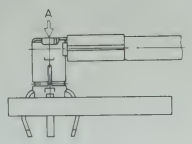
MM3326-2506



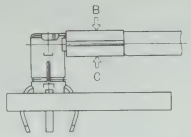
(Unit : mm)

Notice

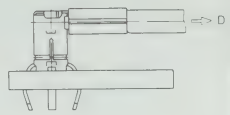
1. Housing Strength.
   Strength A (in the figure) should not exceed 1kgf (2.2 lbs).



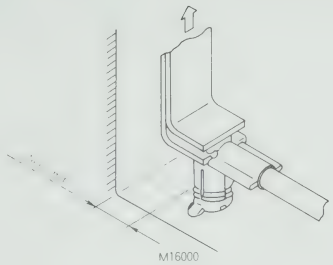
2. Strength of the outer sleeve.
   Strength B (in the figure) should not exceed 0.5kgf (1.1 lbs) and strength C (in the figure) should not exceed 0.3kgf (0.7 lbs).

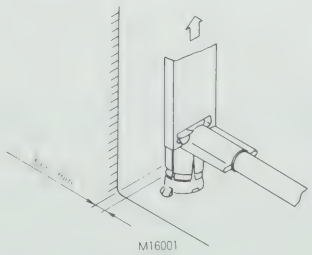


3. Strength of the cable.
   Strength D (in the figure) should not exceed 1kgf (2.2 lbs).



Used special tool for disengagement





M16001 is a tool used to disengage the connector from narrow areas.

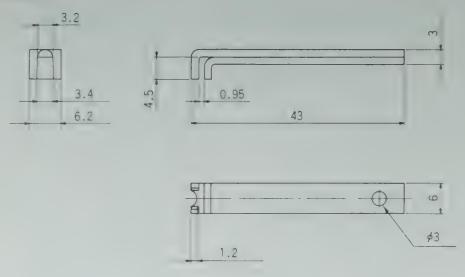
COAXIAL CONNECTOR

muRata

Ultra-Miniature Coaxial Connector BFA Type

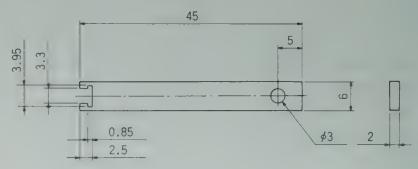
DISENGAGEMENT TOOL

M16000



(Unit : mm)

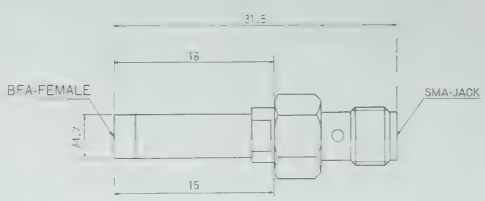
M16001



(Unit : mm)

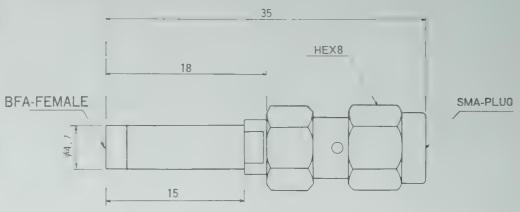
ADAPTER (SMA type connector -BFA type connector)

MM121352



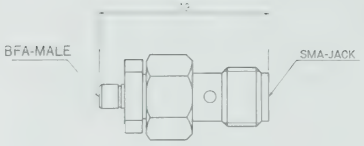
(Unit : mm)

MM121372



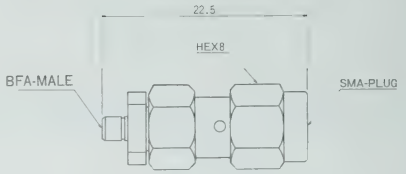
(Unit : mm)

MM121360



(Unit : mm)

MM121380



(Unit : mm)

※Please confirm the type and rated value upon ordering as they are subject to change for improvement without notice. Please contact us for further information

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COAXIAL CONNECTOR

muRata

ULTRA-MINIATURE SMT COAXIAL CONNECTOR CCR TYPE

More Suitable for the Small Sized Equipment !!
Ultra-miniature Coaxial Connector for SMT

FEATURES

1. Ultra-miniature and low profile. (4.2mm MAX)
2. SMD and reflow soldering applicable.
3. Taping package applicable.
4. Mountable by automatic placer.
5. High performance. (V.S.W.R. 1.2MAX at 2GHz)
6. Available for ultra-thin coaxial cables.

APPLICATIONS

Portable telephones, mobile telephones, cordless telephones, GPS, other microwave radio and measurment equipment.

PART NUMBER

●Straight receptacle for printed circuit board.
(Center contact shape : Pin)

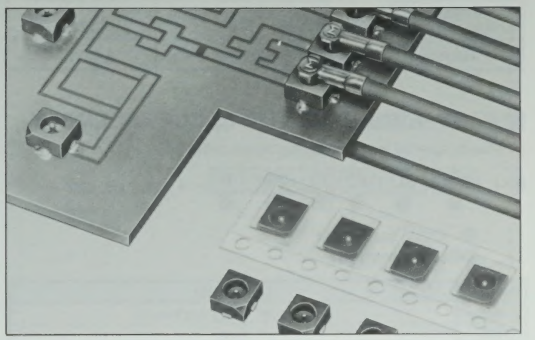
PART NUMBER	PACKAGING	QUANTITY
MM4329-2700	Bulk package	Free
MM4329-2700TB1	178mm Dia. Taping	500pcs/reel
MM4329-2700TB2	330mm Dia. Taping	3000pcs/reel

●Right angle cable assembly with flexible cable.
(Center contact shape : Socket)

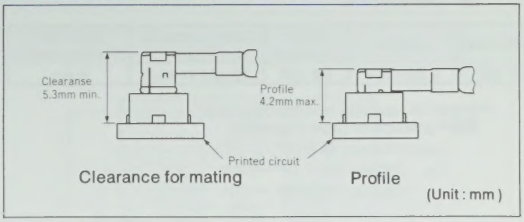
MXSG63□□□□□□

RATING AND CHARACTERISTICS

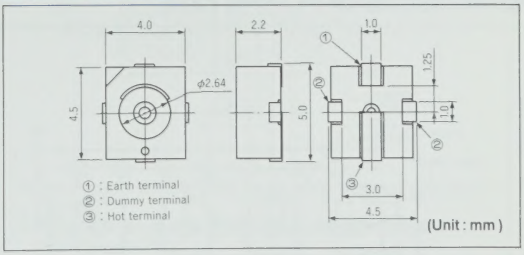
I t e m	Rating and Characteristics
Voltage Rating	250V r.m.s.
Frequency Rating	DC～2GHz
Nominal Impedance	50Ω
Temperature Range	−40℃～+90℃
Insulation Resistance	500MΩ Minimum
Contact Resistance	15mΩ Maximum
Withstanding Voltage	AC300V r.m.s.
V.S.W.R.	1.2 Maximum



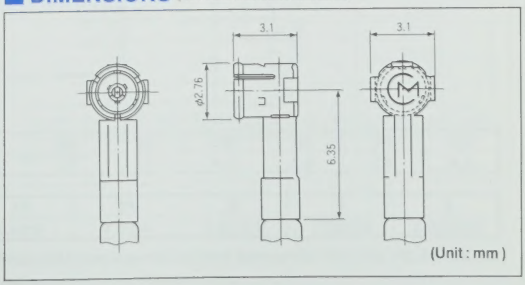
DIMENSIONS OF MATING STATE



DIMENSIONS (MM4329-2700)



DIMENSIONS (MXSG63□□□□□□)



COAXIAL CONNECTOR

muRata

ULTRA-MINIATURE SMT COAXIAL CONNECTOR CCR TYPE

MATERIALS AND FINISH

●MM4329-2700

Part Name	Materials	Finish
Center Contact	Stainless Steel	Gold plated
Outer Contact	Stainless Steel	Gold plated
Insulator	Polyphenylene Sulfide	None

●MXSG63□□□□□□

Part Name	Materials	Finish
Center Contact	Beryllium Copper	Gold plated
Outer Contact	Phospher Bronze	Gold plated and Nickel Plated
Insulator	Fiber Reinforced Polypropylene	None

PART NUMBERING FOR CABLE ASSEMBLY

(※ Please specify the part number when ordering.)

(Ex.) MX ❶ SG ❷ 62 ❸ XX ❹ 200 ❺ 0 ❻

❶ Cable assembly
❷❹Connector code

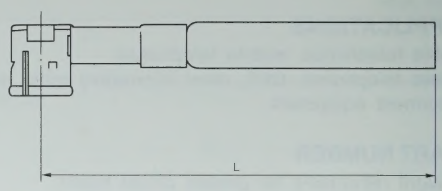
Number	Connector
SG	CCR type Plug connector
XX	Non

❸ Cable number

Number	Cable	Outer Diameter	Outer conductor construction	Minimum Bending radius
63	0.8D-QEV	2.0 mm	Single sealed	8mm

(※)Based on Japanese Industrial Standard.
❺❻Full length of cable assembly
Length L(mm)=❺×10❻
Ex. 500mm=500×10^0→5000
1000mm=100×10^1→1001

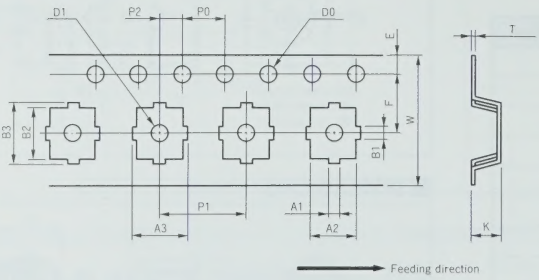
FULL LENGTH TOLERANCE



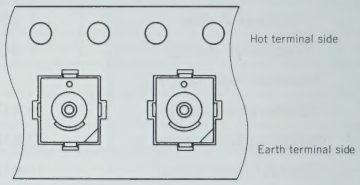
Full length L (mm) (※)		Dimensional tolerance (mm)
Over	Max.	
50	100	± 3
100	500	± 4
500	1000	± 10
1000	----	Total length $^{+2}_{0}$%

※ L =50mm MiN.

DIMENSIONS OF PLASTIC TAPE



Direction of tarminal.



(Unit : mm)

A1	A2	A3	B1	B2	B3	W	D0	D1
1.4	4.2	5.2	1.4	4.7	5.7	12±0.2	$\phi 1.5^{+0.1}_{0}$	1.5MIN.

E	F	K	P0	P1	P2	T
1.75±0.1	5.5±0.1	2.6±0.1	4±0.1	8±0.1	2±0.1	0.3

A1, A2, A3, B1, B2 AND B3 are the bottom dimensions of the cavity.

COAXIAL CONNECTOR

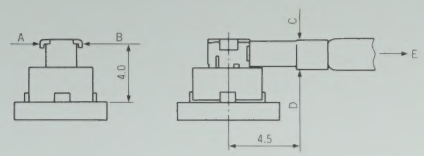
muRata

ULTRA-MINIATURE SMT COAXIAL CONNECTOR CCR TYPE

CAUTIONS FOR USE

1. Various strength at mating state
   Strength less than shown in the right figure is required.
2. Dimensions for installation
   Dimensions shown in the under figure should be used when designing PCB.
3. Engagement
   In the engagement this connector should be mated the other connector in vertical.
4. Disengagement
   Use tool P/N M17000. The connector to be disengaged should be pulled in the direction of engagement. Do not pull on the cable.
5. The coaxial cable and connector should not be twisted.

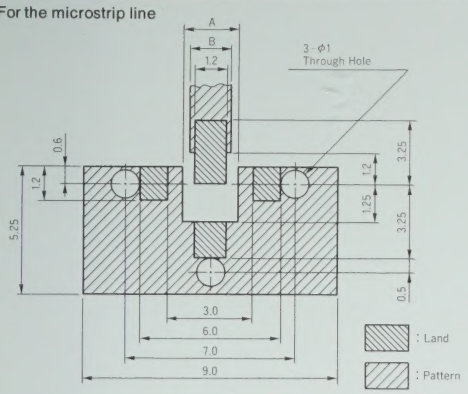
1. Housing Strength.
   Strength A or B (in the figure) should not exceed 1kgf (2.2lbs).
2. Strength of the outer sleeve.
   Strength C (in the figure) should not exceed 0.3kgf (0.6lbs) and strength D (in the figure) should not exceed 0.2kgf (0.4lbs).
3. Strength of the cable.
   Strength E (in the figure) should not exceed 1.5kgf (3.3lbs).



(Unit : mm)

RECOMMENDED MOUNTING DIMENSION

For the microstrip line



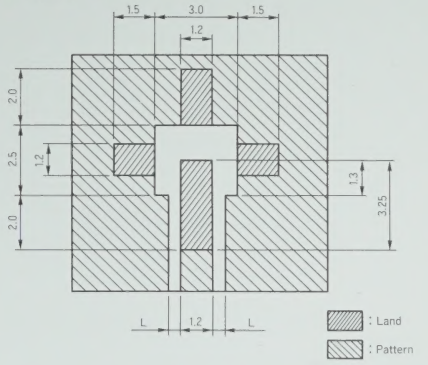
(Unit : mm)

- The material of P.C.B. is the epoxy resin of glass fabric bacs. (ε r=4.8)
- The solder resist should be printed except for the land pattern on the P.C.B.

Tickness of PCB (mm)	A (mm)	B (mm)
0.8	2.14	1.44
1.0	1.82	1.80
1.2	1.71	2.16
1.6	1.62	2.88
2.0	1.59	3.60

RECOMMENDED MOUNTING DIMENSION

For the coplaner line



(Unit : mm)

- The material of PCB is the epoxy resin of glass fabric bacs. (ε r=4.8)
- The solder resist should be printed except for the land pattern on the PCB.

Tickness of PCB (mm)	L 1 (mm)	L 2 (mm)
0.8	0.47	0.144
1.0	0.31	0.151
1.2	0.25	0.155
1.6	0.21	0.160
2.0	0.20	0.163

L1 is the dimension what PCB has the earth pattern in the back side.
L2 is the dimension what PCB doesn't have the earth pattern in the back side.

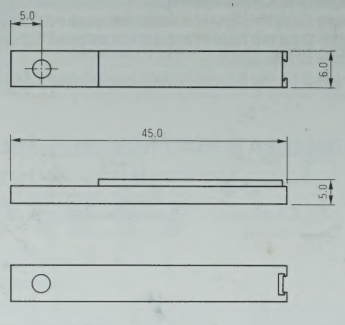
COAXIAL CONNECTOR

muRata

ULTRA-MINIATURE SMT COAXIAL CONNECTOR CCR TYPE

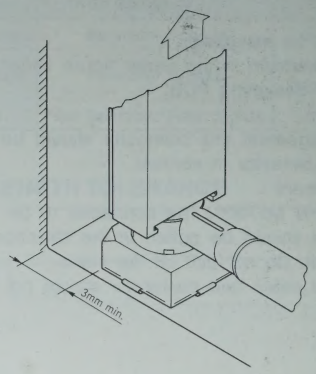
DISENGAGEMENT TOOL

M17000



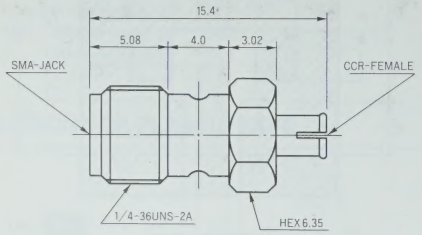
(Unit : mm)

Used special tool for disengagement



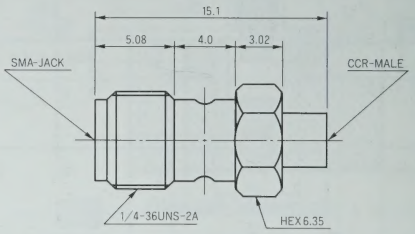
ADAPTER (SMA type connector - CCR type connector)

MM121390 (For CCR type receptacle)



(Unit : mm)

MM121400 (For CCR type cable assembly)



(Unit : mm)

※Please confirm the type and rated value upon ordering as they are subject to change for improvement without notice. Please contact us for further information.

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